

A REVIEW OF THE NEARCTIC SPECIES OF MACROPSIS.
(Homoptera, Cicadellidae.)*†‡

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The genus *Macropsis* was founded by Lewis in 1835 to hold two species, *Cicada virescens* Gmel., and *Cicada flavicollis* Linn., each being placed in a separate division. In 1837, Burmeister, while engaged in splitting up Germar's genus *Bythoscopus*, erected the subgenera *Oncopsis* and *Pediopsis* with *Macropsis* Lewis as the synonym of each. No genotype was fixed for *Oncopsis*, but *Bythoscopus tiliae* Germ. was cited as the typical species of *Pediopsis*. Westwood, in 1840, cited *Cicada flavicollis* Linn. as the type of *Macropsis* Lewis. Burmeister's genus *Pediopsis* therefore became a synonym of *Macropsis* Lewis.

These type fixations were ignored by the older writers, and it was not until 1906 when Kirkaldy pointed out the synonymy that the change was made. As a result much confusion has

*Dissertation presented in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate School of The Ohio State University.

†Contribution No. 109, from the Department of Zoology and Entomology of the Ohio State University.

‡A Taxonomic, Biologic and Faunistic Study of the Nearctic Forms.

prevailed in the nomenclature of the Bythoscopid genera; and care must be taken in accepting the generic names assigned to species by their authors without reference to the descriptions.

In 1889, Van Duzee published the first monograph of the nearctic species, of which there were eight known to him. These species were assigned to the genus *Pediopsis*. Later, in 1898, Osborn and Ball secured information on the early stages of a number of species and again published a monograph of the nearctic species of *Pediopsis*. This time fifteen species were recognized as belonging to the group. Since the appearance of their paper several additional species have been described and information concerning the group has accumulated in the literature. The present study is an attempt to bring together as much of this information as possible, putting it into a form where it will be useful and available to future students. The writer recognizes thirty-two species and three varieties as being present in North America. Of them, all but two species and two varieties are indigenous to the nearctic fauna; and ten species and one variety are described for the first time.

At the present time none of these species is known to be a pest of economic importance. Interest in them is chiefly that of the zoologist and naturalist. As a basis for faunistic and biologic studies, they are a most interesting group.

ACKNOWLEDGMENTS.

The present revision was made possible through the kindness and assistance of Professor Herbert Osborn who, in addition to numerous other favors, placed his valuable collections and library at the writer's disposal. To Professor D. M. DeLong, the writer is likewise indebted for the loan of much valuable material and many helpful suggestions. Acknowledgments are also due the following for the loan of valuable collections: The staff of the U. S. National Museum, especially Mr. P. W. Oman; Professor P. B. Lawson of the University of Kansas; Professor C. J. Drake of Iowa State College for the loan of a number of the Van Duzee types; and Mr. W. J. Gerhard of the Field Museum, Chicago, for the loan of his collection and that of the museum. To each of these the writer expresses his thanks and appreciation, and to Professor C. P. Gillette of the Colorado Agricultural Experiment Station for his assistance in the solution of a puzzling problem. The drawings were made by Mrs. C. W. Taft under the author's supervision.

Genus *Macropsis* Lewis.(Greek: *Macro*, broad—*ops*, face.)

Lewis, Trans. Ent. Soc. Lond., i, p. 49, 1835.

Westwood, Intr. Mod. Classif. Ins. ii, Synop., p. 117, 1840, (names *virescens* Gmein type).*Pediopsis* Burmeister, Gen. Quaed. Ins., pl. 10, 1838. (type *tiliae* Germ.).

Van Duzee, Ent. Am., v, p. 167, 1889, (monograph).

Osborn and Ball, Proc. Dav. Acad. Nat. Sci., vii, p. 111, 1898, (monograph).

Kirkaldy, Haw. S. P. A. Exp. Sta. Bull., 1, p. 345, 1906, (summarizes synonymy).

The leafhoppers of this genus constitute a homogeneous group and are readily distinguished from their nearest allies by the direction of the sculpturing or rugae on the strongly

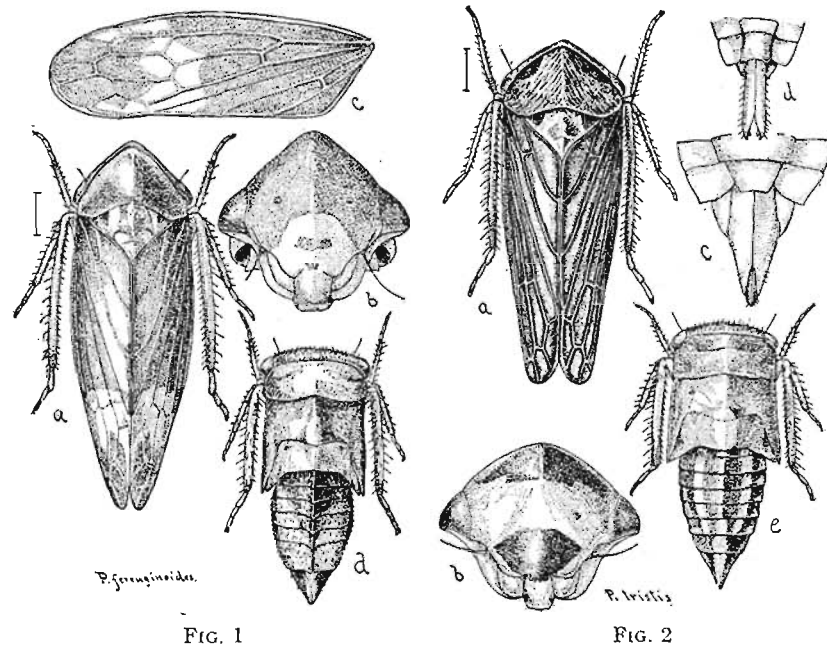


FIG. 1. *Macropsis (Pediopsis) ferruginoides*; a, adult; b, face; c, elytron; d, nymph.
 FIG. 2. *Macropsis (Pediopsis) tristis*; a, adult; b, face; c, ♀, d, ♂ genitalia; e, nymph.

(Cuts of *ferruginoides* and *tristis*, courtesy of Herbert Osborn.)

angulate pronotum. As stated before, these insects have been known under a number of genera, most of them being assigned to *Pediopsis* Burm. Both *virescens*, the type of *Macropsis*, and *tiliae*, the type of *Pediopsis*, are before the writer. These two species do not differ enough to warrant the retention of the genus *Pediopsis*. When treated as a world wide group it will

doubtless be convenient to break the genus up into smaller units. Such a character as the prominent black spot which is found on the outside near the base of each hind tibia of many palaeartic species might be used. However, such characters can scarcely be considered generic.

The following description characterizes the genus as here treated. It has been drawn from Van Duzee's excellent treatise with modifications and deductions.

Head entirely or almost deflexed, forming a narrow margin to the pronotum when viewed from above; with the eyes, as wide or a little wider than the pronotum. Vertex confounded with the front, rugae radiating from the superior apex in the general direction of the ocelli; ocelli on the face about opposite the middle of the eyes, from which they are less distant than from each other; front bounded by a slight depression, not quite reaching the line of the ocelli; a sharp oblique ridge from the outer angle of the eye to near the base of the clypeus, shielding the base of the antenna. Lorae of the female prominent, tumid; those of the male often reduced and nearly obscured by the swollen and bulging clypeus; outer cheeks narrow below where they are largely covered by the lorae. Clypeus variable in shape and outline, presenting some good specific characters. Pronotum distinctly angulate before, projecting well beyond the anterior extremities of the eyes; sides very short, lateroposterior angles rounded; posterior margin broadly, sometimes angularly concave; rugae radiating from a central line obliquely towards the posterior angles; a pair of distinct impressions or smooth areas on the anterior margin, one a little mesad of either eye. Scutellum broadly triangular, a transverse depression before the apex, and a triangular callosity within either basal angle. Elytra without an appendix, costa more or less arcuated, inner margin straight; corium normally with six closed cells, one basal, two discal, and three anteapical; membrane of five apical areoles; clavus with two simple parallel veins terminating on the sutural margin.

The following key will aid in separating the species of *Macropsis* from their relatives in other genera:

KEY TO THE GENERA OF THE BYTHOSCOPIINAE.

1. Antennae inserted in a feeble cavity, not covered by a ledge, their bases free 2
- Antennae inserted in a deep cavity beneath a ledge. 3
2. Elytra without an appendix. *Agallia*
- Elytra with a distinct appendage *Idlocerus*
3. Pronotum distinctly produced beyond the anterior margins of the eyes, vertex angulate anteriorly. 4
- Pronotum not produced beyond the anterior margins of the eyes, vertex rounded anteriorly *Bythoscopus*
4. Pronotal rugae transverse, pronotum not distinctly angulate anteriorly, *Oncopsis*
- Pronotal rugae oblique, converging toward the vertex, pronotum distinctly angulate anteriorly. *Macropsis*

CHARACTERS USED IN CLASSIFICATION.

An extended search for characters of specific value disclosed that many of those of ordinary recourse, when studying the higher genera of the family, are practically valueless. Osborn and Ball found the external genitalia useless as specific characters; and, with the exception of the *trimaculata* group, the writer found the internal male genitalia of no more assistance. As the search continued, it became apparent that the members of this genus have become specialized along quite different lines.

The anterior angle of the pronotum is constant for the species and varies enough from species to species to be useful. With some it takes the form of a well defined acute-, right-, or obtuse-angle. With others it is not so well defined, appearing more parabolic in outline. The comparative coarseness or fineness of the rugae (the writer had *viridis* Fitch in mind when preparing the descriptions), their relative obliqueness, and the depth of the punctures, are also useful. The length of the anterior impressions, as compared with the long diameter of the eye, might be more useful than indicated. Some value has been attached to the depth of the sinus in the posterior margin and the amount of angulation which it possesses. The amount of convexity possessed by the pronotum is a character employed to some extent.

Characters found in the shape and structure of the face have proved to be the most useful and reliable. The term "face" as used in this paper refers to the entire frontal aspect of the insect. When viewed from the side, the outline of this aspect shows a varying amount of tumidity, in some species approaching flatness, and in others becoming distinctly concave. The rugae on the upper part of the face (vertex), and the punctures lower down, vary somewhat in coarseness and depth from species to species. Of all the characters found in the face, the variations in the shape and tumidity of the clypeus have been the most useful. The lateral margins of this sclerite are usually straight, and vary from being strictly parallel in some species to those in which they show varying amounts of convergence toward the rounded apex. The apex is depressed only on the narrow submargins before the lorae in some species, in others it is depressed entirely across, while in still others it is depressed not at all. In some species the clypeus of the male is of the same shape as that of the

female, while in others it has become greatly swollen basally, merging with the lower part of the front, the lateral margins bulging out over the lorae, often nearly obscuring them. In the latter example the sutures have become obsolete. These variations have been valuable aids in separating males of similar appearance. Drawings which have been prepared for each species, illustrate these characters to greater advantage.

The elytra offer some characters, such as variations in length and breadth, and in thickness. In some species, such as those of the *trimaculata* group, they are short and thick, almost coriaceous in texture, while in others they are thin and more or less hyaline. As auxiliary characters, the strength and prominence of the veins of the elytra have been of some use. In some species they are strong and raised, while in others they are weak and appear little above the upper surface. The reticulate venation of Van Duzee's *nubila* is unique.

Both color and color pattern have proved to be quite constant and specific. In most cases they are the most obvious and accessible characters to use in classification. Most of the exceptions alluded to by earlier workers are now known to be due to a confusion of species. On the whole, the color of a species varies more in intensity than in pattern. The green of some species seems to be quite stable, while in others it quickly fades, the insect becoming yellowish instead.

The heavy maculations with which the anterior impressions on the pronotum of some species are marked, and the fuscous punctures on the disc of others, are useful. Three of our species are known to have the face specifically spotted, and another has the face thickly set with impressed black points. The presence or absence of a black mark on each epimeron is constant enough to be specific. This mark seems to be primarily a character of the males. Less frequently it occurs on females, and those females from which it is normally absent usually possess additional coloration of the male when it is present. It is a characteristic mark of both males and females of a number of species. The under surface of the bodies of many species is pale and immaculate, while in others it is marked in various degrees with fuscous. In so far as known, all introduced species have a prominent black mark on the outside of the hind tibia near the base. No native species is known to have such a mark.

The scutellum of many species bears a blackish or fuscous triangle within either basal angle. In other instances the scutellum may be ornamented with characteristic spots or points. The color or color pattern of the elytra furnishes some of the most obvious and useful characters for sorting out and determining species. They may be of the same shade or color throughout, or they may be varicolored. In the latter case, the color pattern may appear as transverse bands on a hyaline background, as hyaline bands in contrast with the adjacent opaque background, as longitudinal fasciae, as well defined spots, or in various combinations of these.

The above are some of the most useful and dependable characters for defining species in this group. The reader must bear in mind that seldom is one character sufficient to place a species, but the right combination of several characters. Structural characters are the most natural and dependable, but the most difficult to use. For this reason they have been augmented by characters found in the insect's color and color pattern whenever possible.

The following key will aid in separating the species and varieties from each other:

ARTIFICIAL KEY TO NEARCTIC SPECIES OF MACROPSIS.

- | | |
|---|----------------------|
| 1. Elytra reticulate, (S. California). (Page 795)..... | nubila |
| Elytra not reticulate..... | 2 |
| 2. Hind tibiae each bearing a prominent black spot near the base (sometimes
obsolete in <i>virescens</i>)..... | 3 |
| Hind tibiae not spotted..... | 6 |
| 3. Color fulvous to tawny, all three pairs of tibiae with spots. (Page 801)..... | ulmi |
| Color green, hind tibiae only bearing spots..... | 4 |
| 4. Vertex unmarked. (Page 798)..... | virescens |
| Vertex bearing a prominent black spot at apex..... | 5 |
| 5. With two longitudinal black fasciae from vertex onto clavus. (Page 800),
var. <i>latifasciata</i> | |
| Without black stripes. (Page 799)..... | var. <i>graminea</i> |
| 6. Elytra of the same color or shade throughout (avoid confusing with
underlying body color)..... | 7 |
| Elytra not of the same color or shade throughout..... | 34 |
| 7. Elytra green or greenish hyaline, sometimes slightly smoky..... | 8 |
| Elytra otherwise..... | 20 |
| 8. Epimera each bearing a distinct black spot..... | 9 |
| Epimera unmarked..... | 13 |
| 9. Females..... | 10 |
| Males..... | 11 |
| 10. Large, 6 mm. in length, head distinctly angulate anteriorly; head, thorax,
and legs usually fulvous. (Page 814)..... | erythrocephala |
| Smaller, 5 mm. in length, head obtusely angulate anteriorly, body uni-
colorous. (Page 806)..... | occidentalis |
| 11. Extremities of tibiae distinctly banded with black..... | 12 |
| Extremities of tibiae not banded with black, (Western phase) (Page 814),
erythrocephala | |

12. Large, 5 mm. in length, immaculate. (Page 803)..... *trivialis*
 Smaller, 4 mm. in length, face distinctly banded or spotted with black.
 (Page 802)..... *reversalis*
13. Females..... 14
 Males..... 19
14. More than 5 mm. in length..... 15
 5 mm. or less in length..... 17
15. Body concolorous with elytra..... 16
 Head and thorax reddish-brown above. (Page 812)..... *rufocephala*
16. Robust in form, clypeus tumid, keystone-shaped. (Page 804)..... *viridis*
 More slender in form, clypeus not so tumid, sides more nearly parallel.
 (Page 803)..... *trivialis*
17. 5 mm. in length, elytra free of smokiness. (Page 805)..... *hesperia*
 Less than 5 mm. in length, elytra smoky..... 18
18. Clypeus nearly parallel-margined, elytra smoky, especially on the clavus.
 (Page 827)..... var. *gleditschiae*
 Clypeus distinctly keystone-shaped, elytra faintly smoky apically.
 (Page 827)..... *confusa*
19. Robust in form, face long, smokiness of elytra concentrated on claval
 areas. (Page 827)..... var. *gleditschiae*
 Slender, face short, smokiness of elytra wanting or limited to apical
 areas. (Page 827)..... *confusa*
20. Elytra amber to smoky amber..... 21
 Elytra otherwise..... 30
21. Females..... 22
 Males..... 24
22. Epimera each bearing a prominent black spot. (Page 816)..... *cinerea*
 Epimera unmarked..... 23
23. Head and pronotum green, immaculate. (Page 817)..... *aurifera*
 Head and pronotum fusco punctate above. (Page 823)..... *robusta*
24. Head and pronotum green to yellowish-green, immaculate, abdomen
 fulvous..... 25
 Head, pronotum, and abdomen otherwise..... 27
25. Rugae of pronotum distinct, punctures deep. (Page 806)..... *occidentalis*
 Rugae of pronotum less distinct, punctures shallow..... 26
26. Clypeus not basally tumid, lateral margins well defined, nearly parallel.
 (Page 805)..... *hesperia*
 Clypeus basally tumid, lateral margins bulging out over the lorae, the
 sutures appearing obsolete. (Page 804)..... *viridis*
27. Anterior impressions concolorous with rest of pronotum..... 28
 Anterior impressions darkly maculate with fuscous..... 29
28. Large, 4.5 mm. in length, elytra sub-coriaceous, coarsely punctured.
 (Page 823)..... *robusta*
 Smaller, 4 mm. in length, elytra thin, not coarsely punctured. (Page 824),
basalis
29. Pronotum obtuse-angled before, lateral margins of clypeus bulging out
 over the lorae. (Page 821)..... *bifasciata*
 Pronotum right-angled before, lateral margins of clypeus nearly parallel,
 distinct, (Eastern phase). (Page 814)..... *erythrocephala*
30. Elytra whitish hyaline, sometimes very faintly greenish. (Page 815)..... *pallida*
 Elytra brownish-black to black..... 31
31. Females..... 32
 Males..... 33
32. Lower half of face and beneath pale, immaculate, epimera unmarked.
 (Page 809)..... *bicolor*
 Beneath nearly black, epimera each bearing a heavy black bar which
 is obscured by impigmentation, (Western phase). (Page 809)..... *sordida*
33. Beneath pale, stained with fuscous, lateral margins of clypeus bulging
 out over the lorae, the sutures appearing obsolete. (Page 809)..... *bicolor*
 Beneath nearly black, lateral margins of clypeus short and distinct, but
 nearly parallel, (Western phase). (Page 809)..... *sordida*
34. Face with conspicuous impressed black points or spotted with black..... 35
 Face without points or spots, sometimes suffused with fuscous..... 37

35. Green or yellowish-green, elytra greenish hyaline, veins usually brown or brownish-black, (Arizona). (Page 798)..... *punctifrons*
Brownish or cinereous-brown, elytra brownish-cinereous, sub-hyaline, veins pale..... 36
36. Large, face with a broad black band above and a large black spot below, veins of elytra pale, narrowly margined with fuscous. (Page 822)..... *tristis*
Small, face thickly set with prominent deep black points, elytra stippled with brownish, veins pale, outlined with impressed black points, (Arizona). (Page 796)..... *gerhardi*
37. Elytra hyaline with well defined and nearly continuous transverse fuscous bands..... 38
Elytra otherwise..... 41
38. Bases of elytra heavily banded with deep brownish or fuscous..... 39
Bases of elytra free of brownish or fuscous..... 40
39. Large, 6 mm. in length, head and thorax concolorous with rest of body, male smaller. (Page 817)..... *osborni*
Smaller, 5 mm. in length, head and thorax reddish-brown above in contrast with the greenish body (female). (Page 824)..... *basalis*
40. Elytra narrowly twice banded with fuscous, anterior band oblique, interrupted at the claval suture. (Page 821)..... *bifasciata*
Elytra broadly twice banded with fuscous, anterior band transverse, not interrupted at claval suture. (Page 811)..... *canadensis*
41. Elytra marked with black or deep fuscous as ill-defined mottlings or patches, or definitely restricted to certain areas or patterns..... 42
Elytra deep brownish-opaque, marked with a transverse hyaline band or pellucid white spots..... 44
42. Black of elytra irregularly distributed in the form of mottlings and ill-defined patches. (Page 809)..... *sordida*
Black of elytra definitely restricted to certain areas or patterns..... 43
43. Clavus deep black, corium of female green, that of male smoky amber. (Page 808)..... *suturalis*
Black or fuscous of elytra spreading down to near costa, costa green or greenish hyaline. (Page 825)..... *fumipennis*
44. Elytra deep brownish-opaque, a transverse hyaline band before the apex..... 45
Elytra brownish-opaque, marked with round pellucid white spots or not at all..... 47
45. Elytra uniformly ferruginous-brown, hyaline band narrow..... 46
Elytra blackish, hyaline band usually indefinite, black in base of elytron often confined to corium and concentrated along costa. (Page 819), *nigricans*
46. Head strongly angulate before, epimera with heavy black spots. (Page 813)..... *ferruginoides*
Head not strongly angulate before, epimera unmarked. (Page 816), *delongi*
47. Blackish-brown, three pellucid white spots on the corium, clavus cinereous. (Page 828)..... *trimaculata*
Brownish, one pellucid white spot on corium, if male, usually none, clavus concolorous with corium. (Page 830)..... *insignis*
Reddish-brown, a pellucid white spot on the corium and one on the base of clavus. (Page 832)..... *quadrinaculata*

Macropsis nubila (Van D.).

Pediopsis nubila Van D., Ent. Am., vi, p. 37, 1890.

Differs from all known species of *Macropsis* by the reticulate-veined elytra. Length: female, 4 mm., width, 1.5 mm. Male unknown.

Pronotum parabolically obtuse-angled before, scarcely convex, anterior impressions as long as the long diameter of the eye; the

oblique rugae present in all other species appear to have been replaced by very coarse punctures; median line indicated; posterior margin with a shallow angulate sinus. Face nearly flat when viewed from the side, rugae above rather coarse, punctures below more minute. Clypeus of the female longer than its basal width, the sides straight and diverging slightly toward the broadly rounded apex which is depressed only on the narrow submargins before the lorae. Lorae very broad and flat. Elytra broad and short, subcoriaceous, rugose, the veins reticulate, the apex broadly rounded. Scutellum coarsely punctured on the disc.

Color: Cinereous to fulvous, the elytra whitish, maculate with brown. Eyes brown. The brown spots on the elytra tend to be distributed as follows: on the clavus, at either end and in the middle, the central spot appearing to continue over onto the corium where it widens toward the costa. The whitish areas are distinctly pellucid between the veins.

Four female specimens from Los Angeles County, California, Coquillett collector, are before the writer. This species presents a number of characters that would tend to place it as a *Bythoscopus*. The short deeply punctured subcoriaceous elytra would tend to place it there, as would also the striation of the pronotum. However, the head is as wide as the pronotum and is not transverse, the anterior margin of the pronotum being produced well beyond the anterior extremities of the eyes. The pronotum is coarsely striate, or punctate, the striations not definitely oblique as in *Macropsis* nor transversely parallel as in *Bythoscopus*. In addition, there is a partially developed median line or carina on the pronotum so often present in *Macropsis*.

With the above characters in mind the writer cannot agree with Osborn and Ball that the species is a *Bythoscopus* and does not belong to *Macropsis*. The reticulate venation makes it unique among the species known to date.

Host: Unknown.

Location of types: Iowa State College, Ames.

***Macropsis gerhardi* sp. n.**

Pale greenish-brown; face, pronotum, and scutellum strikingly marked with coarse black evenly-set impressed points. Length: female, 4 mm., male, 3.5 mm.; width: female, 1.35 mm., male, 1.25 mm.

Pronotum parabolically obtuse-angled before, moderately convex, elongate anterior impressions shorter than the long diameter of the eye; rugae appearing as coarse oblique punctures, median line wanting;

posterior margin with a moderate angulate incision. Face somewhat tumid when viewed from the side, punctures coarse and evenly distributed, the front bearing a pair of prominent parenthesis-like glabrous areas. Clypeus of the female considerably wider than long, the sides converging rapidly toward the rounded apex which is only slightly depressed on the narrow submargins before the lorae; that of the male, together with the front, greatly swollen, the sides bulging out over the lorae. Lorae of the male reduced to mere lines, those of the female prominent, tumid, and punctate. Scutellum coarsely punctate, a pair of glabrous spots immediately anterior to the transverse impression, the basal triangles tending to become glabrous. Elytra short, subcoriaceous, acutely rounded at the apex, veins strong.

Color: Pale greenish-brown; face, pronotum, and scutellum uniformly and thickly set with coarse black impressed points, including the lorae and clypeus of the female. Clypeus of the male black, sometimes including a central light area. Ocelli brownish, eyes fuscous. The impressed black points of the pronotum and scutellum tend to spread over onto the bases of the elytra. Beneath pale brownish, somewhat stained with fuscous; epimera each bearing a large sooty black spot. Anterior impressions of the pronotum immaculate, also the glabrous spots on the scutellum. Elytra brownish, stippled with fuscous; veins immaculate, paler, outlined with impressed fuscous points. Wings dusky, veins fuscous.

A series of ten specimens, two males and eight females, from Nogales, Arizona, collected by F. W. Nunenmacher in August and September, 1906; a second series of eleven specimens, four males and seven females, from Tucson, Arizona, collected by A. A. Nichol on June 7, 1924; and two female specimens from the Santa Rita Mountains of Arizona, collected by F. H. Snow in June and July, are before the writer. The Nunenmacher specimens are from the collection of W. J. Gerhard, who had recognized them as belonging to an undescribed species, but who was kind enough to permit the writer to describe them here. It gives me considerable pleasure to name the species in Mr. Gerhard's honor, and by so doing to express my appreciation of the favors he has extended, both past and present. The Nunenmacher specimens are deposited as follows: Holotype, female, and allotype, male, in the collection of Herbert Osborn; two paratypes, male and female, in the U. S. National Museum; and six paratypes in the collection of W. J. Gerhard. Of the second series, two specimens, a male and female, have been deposited in the collection of Herbert Osborn; two specimens, a male and female, in the writer's collection; and the remainder in the collections of the University of Kansas.

Host: Unknown.

Macropsis punctifrons (Van D.).*Pediopsis punctifrons* Van D., Ent. Am., v, p. 174, 1889.

Pale yellowish-green; face, pronotum, and scutellum with small black spots; elytra greenish hyaline with brownish veins: Length: female, 4 mm., male, 3.25 mm.; width: female, 1.5 mm., male, 1.25 mm.

Pronotum right-angled before, moderately convex; anterior impressions as long or longer than the long diameter of the eye; rugae rather coarse and reticulate, median line wanting; posterior margin roundly incised. Face quite tumid when viewed from the side; rugae and punctures shallow, somewhat obscure on the front. Clypeus of the female rather narrow, broadest at the base, sides nearly straight, converging somewhat toward the narrowly rounded apex; that of the male somewhat tumid, the sides diverging toward the base, spreading over and nearly obscuring the lorae, sutures indistinct. Lorae of the female of medium width, scarcely tumid. Scutellum very finely punctate on the disc. Elytra short, acutely rounded at the apex, the veins strong.

Color: Pale yellowish-green. Face marked with small black spots; an irregular mark at the apex, a circular one on either side above the ocellus, and two comma-shaped marks facing one another on the upper part of the front; ocelli fuscous, eyes pale. Beneath pale green, epimera each marked with a small black spot. Anterior impressions of the pronotum each bearing a row of 3-5 impressed black points which sometimes coalesce to form a black line; disc sometimes stained with fuscous. Scutellum pale, the basal triangles infuscated, a pair of impressed black points immediately anterior to the transverse impression, the apex infuscated. Elytra hyaline, greenish toward the base, the veins fuscous. Wings hyaline, the veins fuscous.

As a rule the females are lighter in color than the males and sometimes almost immaculate. However, the color pattern is essentially the one given, the difference being due to the amount of pigment deposited.

The specimens studied for the preparation of this description are from Huachuca Canyon, Arizona; Santa Catalina Mountains, Arizona; Tucson, Arizona; and three males from the type series, also from Arizona.

Host: Unknown.

Location of types: Iowa State College, Ames.

Macropsis virescens (Gmel.).

Cicada virescens Gmelin in Linnaeus' Syst. Nat., 13th ed., i, pt. 4, p. 2111, 1788.
Pediopsis virescens Osborn, Me. Agr. Exp. Sta. Bull. 238, p. 90, 1915.

Of the same general color and appearance as *viridis* Fitch, but considerably smaller and of a much more slender form, the

head more distinctly pointed and each hind tibia bearing a conspicuous black spot on the outside near the base. Length: female, 5 mm., male, 4.4 mm.; width: female, 1.25 mm., male, 1 mm.

Pronotum considerable less than right-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae coarser than those of *viridis*, strongly oblique, median line nearly obsolete; posterior margin with a deep angulate incision. Face nearly flat when viewed from the side, often slightly concave below the eyes, rugae and punctures coarser than those of *viridis*, distinct. Clypeus of the female broad, as broad as long, the sides straight and converging toward the rounded apex which is depressed only on the narrow submargins before the lorae; that of the male basally, together with the apex of the front, swollen, the sides bulging out over the lorae, the sutures appearing obsolete. Lorae of the female broad and tumid, those of the male reduced to little more than mere lines. Scutellum nearly impunctate. Elytra long and narrow, narrowly rounded apically, the veins weak.

Color: Female yellowish-green, nearly immaculate. Elytra greenish-hyaline, the veins green. Male yellowish-green, more or less infuscated above. Elytra greenish-hyaline, smoky apically, the veins green. Beneath immaculate, the abdomen more or less infuscated above, the posterior margins of the segments narrowly pale in darker individuals. Basal angles of the scutellum more or less infuscated in both sexes. The hind tibiae of both sexes each bear a conspicuous black spot on the outside near the base. Epimera unmarked.

The writer has recognized specimens of this species from Maine, Massachusetts, Pennsylvania, Ontario, and Wisconsin. Osborn was the first to record the occurrence of this well known European insect in America. He also pointed out that when the hind legs are in a position for leaping, the spots on the bases of the tibiae have a position with respect to the insect's body approaching that of the spots so frequently found on the epimera of American species. As pointed out elsewhere, no American species known to date has the tibiae so ornamented.

Host: Willow, *Salix nigra* Marsh., according to the labels on specimens collected in the Arnold Arboretum by H. K. Morrison.

Macropsis virescens var. *graminea* (Fab.).

Cicada graminea Fabricius, Ent. Syst. Suppl., p. 521, 1798.

Pediopsis graminea Osborn, 20th Rept. N. Y. State Ent., p. 505, 1905.

Macropsis virescens var. *graminea* (Fab.) Weiss & Dickerson, J. Econ. Ent., xii, pp. 437-440, 1919.

Differs from *virescens* Gmel. only by the shiny black spot with which the apex of the vertex is ornamented.

Morphologically, this form is the same as *virescens*.

Color: The round shiny black spot at the apex of the vertex is the one color character which distinguishes this variety from *virescens*.

A great many specimens of this form from New York, Pennsylvania, and Wisconsin have been available for these studies. Herbert Osborn was the first to record the presence of this European insect in North America, the specimens on which he based his record coming from Fitch Point, near Salem, New York. D. M. DeLong took numbers of this leafhopper on Presque Isle, Pennsylvania, and the writer found it occurring in numbers near Waterloo, Wisconsin. Weiss and Dickerson have recorded the life history of the species in New Jersey and described the various stages.

Host: Poplar, *Populus nigra* L., according to Weiss and Dickerson. The writer collected the Wisconsin insects from *Salix elegantissima* Koch on which they were breeding. Apparently this insect is more diversified in its food habits than other members of the group.

***Macropsis virescens* var. *latifasciata* var. n.**

Differs from all other forms of *virescens* Gmel. by the two broad black stripes which originate on the vertex between the eyes and extend back over the pronotum and scutellum onto the claval areas of the elytra where they seem to converge.

Structurally, this variety is the same as that of the typical *virescens*.

Color: The color characters are the same as those of *graminea* Fab., with the addition of the two broad black fasciae. These stripes originate on the vertex between the eyes, approaching but not touching either eye nor the spot at the apex, and extend downward in obtuse points toward the ocelli; continue back onto the pronotum where they are separated by nearly the width of one, keeping well within the lateral margins, and cross the scutellum, occupying the basal angles, onto the claval areas of the elytra where they appear to converge.

The above description is based on three female specimens. Holotype, Presque Isle, Pennsylvania, July 10, 1920, D. M. De Long collector, in the collection of D. M. De Long; paratype, Vineland, Ontario, September 10, 1922, Wm. Robinson collector, in the University of Kansas collections; and paratype, Batavia, New York, August 4, 1916, H. H. Knight collector, in the collection of Herbert Osborn.

Host: Occurs along with *graminea*.

***Macropsis ulmi* (Scott).**

Pediopsis ulmi Scott, Ent. Mag., x, p. 129, 1873.

Testaceous-brown, each tibia bearing a black spot on the outside near the base, most pronounced on the third pair. Length: female, 4.5 mm., male, 4 mm.; width: 1.25 mm.

Pronotum sharply right-angled before, strongly convex; anterior impressions as long as the long diameter of the eye; rugae coarse, strongly oblique, median line indicated; posterior margin with a deep angulate incision. Face nearly flat when viewed from the side, rugae and punctures shallow and indistinct. Clypeus very broad, as broad as long, flat, the sides straight, converging slightly toward the rounded semicircular apex which is not depressed; sutures distinct in both sexes. Lorae tumid, somewhat reduced in the male. Scutellum finely crenulate-punctate on the disc. Elytra rather long, broad, and rounding at the apex, the veins strong.

Color: Testaceous-brown to fulvous, greenish in fresh or living specimens. Face and beneath ochraceous, each epimeron bearing a large black spot; tergites of the male blackish, the posterior margins of those of the abdomen narrowly yellowish. The underparts of fresh or living female specimens are greenish with a silvery appearance, the viridity fading to yellowish. Tibiae each with a black spot on the outside near the base, most pronounced on the third pair, extremities of the tarsi blackish. Pronotum ochraceous, sometimes greenish, anterior impressions concolorous. Scutellum brownish-yellow, the basal angles each with a large brown triangle. Elytra deep testaceous-brown, subhyaline, the veins concolorous. Wings smoky hyaline, the veins fuscous.

The specimens before me are from the District of Columbia, and Dresher and Spring Mills, Pennsylvania, males and females. The District of Columbia specimen, a female, bears the host label "Elm" and is dated "vii-2-'92." Those from Dresher bear the host label "Ulmus" and the date "vi-29-'17," the Spring Mill specimens bearing a later date. Thus another European species had become established on the North American Continent as early as 1892. Dr. De Long informs me that Dresher and Spring Mill are in a region where considerable nursery stock is grown. It may be inferred that this leafhopper, like others, has reached this region through the agency of imported nursery stock. It is surprising that more foreign species of leafhoppers have not been added to our fauna in this way. Many species pass the winter as eggs which are concealed under the bark of the younger twigs and branches of the host tree, making it practically impossible to detect their presence. The dormant trees, on arriving at their destination are planted

in the nursery; and with the coming of warm weather, the eggs hatch and another species may become established in a new home.

These specimens agree nicely with Scott's detailed description and leave little question as to their identity. In keeping with so many palaeartic species of *Macropsis*, these insects bear a large black spot on the outside near the base of each hind tibia.

Host: Elm, *Ulmus* sp., probably *americana* L. in this region.

***Macropsis reversalis* (O. & B.).**

Pediopsis reversalis Osborn and Ball, Proc. Dav. Acad. Nat. Sci., vii, p. 69, 1898.

Small, light green; female immaculate, the male with two broad bands, sometimes broken up into spots, on the face; and extremities of the legs and spots on the epimera, black. Length: female, 4.5 mm., male, 4 mm.; width, 1.25 mm.

Pronotum right-angled before, strongly convex; rugae fine, reticulate, indistinct over the entire surface, median line wanting; elongate impressions on the anterior margin shorter than the long diameter of the eye; posterior margin with a moderate angulate incision. Face somewhat tumid when viewed from the side; rugae and punctures fine and indistinct. Clypeus of the female as long as the basal width, the sides straight and converging rapidly toward the rounded apex which is strongly depressed on the narrow submargins before the lorae; that of the male basally, together with the apex of the front, tumid, the sides bulging out over the lorae, the sutures appearing obsolete. Lorae small, tumid, those of the male much reduced. Elytra rather strong, narrowly rounded at the apex.

Color: Light green; pronotum and face of the female yellowish-green, the male with a broad black band above on the face, extending down to the middle of the front in a triangular point, and another between the lower margins of the eyes. Beneath yellowish-green, epimera of the male and the extremities of the fore tibiae and all the tarsi black. Female immaculate, or nearly so, the epimera seldom marked. Elytra greenish hyaline. Wings whitish hyaline, the veins white. Some of the males have the bands on the face reduced to three spots, one on the apex above, and one just within and below each ocellus.

The above description has been drawn from a number of specimens from Iowa, Ohio, and Pennsylvania. The Iowa series contained a number of type specimens. Van Duzee has also collected the species at Colden, N. Y.

Host: Willow, *Salix* sp.

Location of types: Collections of Herbert Osborn, E. D. Ball, and Iowa State College, Ames.

***Macropsis trivialis* (Ball).**

Pediopsis trivialis Ball, Can. Ent., xxxiv, p. 304, 1902.

Resembles *viridis* Fitch, but of a more slender form, the coloration of the male distinct and specific. Female yellowish-green, immaculate; male yellowish-green, spots on the epimera, extremities of the fore and middle tibiae, ultimate segments of the tarsi and tarsal claws, black. Length: female, 5.5 mm., male, 4.5 mm.; width: female, 1.5 mm., male, 1.45 mm.

Pronotum less than right-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae coarser than in *viridis*, reticulate, median line indicated; posterior margin with a shallow angulate incision. Face moderately tumid when viewed from the side, rugae and punctures very fine and indistinct. Clypeus of the female a little longer than its basal width, the sides straight and more nearly parallel than those of *viridis*, the apex depressed only on the narrow submargins before the lorae; sutures distinct, though not as deep as those of *viridis*, the clypeus less tumid and appearing to occupy more nearly the same plane as the face. Clypeus of the male narrower than that of *viridis*, the sides not bulging out over the lorae to the same extent, the apex not as much depressed, and the surface more polished. Lorae of the female broad and tumid, those of the male almost obsolete. Scutellum impunctate. Elytra long and narrower than those of *viridis*, the second apical cell usually more than half the length of the middle antepical cell, apex narrowly rounded, the veins strong.

Color: Female yellowish-green, immaculate; elytra greenish hyaline, the veins concolorous. Male yellowish-green; spots on the epimera, extremities of the fore and middle tibiae and the tarsal claws, black. Elytra greenish hyaline, somewhat smoky toward the apex. Wings of both sexes whitish hyaline, the veins concolorous.

Numerous specimens of this species from Maryland, Pennsylvania, Ohio, Michigan, Illinois, Wisconsin, South Dakota, Kansas, Oklahoma and Colorado have been available for these studies. This species seems to be nearly as common and cosmopolitan in its distribution as *viridis* Fitch, with which it has often been confused. It will be noted that the males are distinctly marked and resemble more nearly those of *reversalis* O. & B. The females resemble those of *viridis* very closely. However, if one will bear in mind that the female of *trivialis* is a more slender appearing insect, and combine this with the differences found in the contour of the face, the more pointed head, and in the shape of the clypeus, he will be able to separate

the females, in the absence of males, with considerable certainty. These studies do not confirm Ball's remarks on the relationship of this species to *erythrocephala* G. & B., but tend to show that *erythrocephala* belongs to a much different morphological group.

Host: Willow, *Salix amygdaloides* Anders., according to Ball (1). While collecting on the shore of Indian Lake, Ohio, on July 3, 1931, the writer swept an isolated willow shrub from which he obtained males and females of this species in numbers. No other species of *Macropsis* were present on this host. In Ashtabula County, Ohio, however, the species was swept from a thicket of mixed willows in association with other forms of *Macropsis*.

Location of types: Collection of E. D. Ball.

Macropsis viridis (Fitch).

Pediopsis viridis Fitch, Homop. N. Y. State Cab., p. 59, 1851.

Female yellowish-green, immaculate; male yellowish-green, elytra amber-brown, epimera each bearing a broad black dash, abdomen fulvous, the tergites blackish. Length: female, 5.5 mm., male, 4.5 mm.; width: female, 1.8 mm., male, 1.5 mm.

Pronotum right-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae indistinct, reticulate, those of the males coarser, median line indicated; posterior margin with a moderately deep ovoid incision. Face nearly flat when viewed from the side, slightly concave below the apex in many individuals; rugae and punctures moderately fine and indistinct. Clypeus of the female as wide at the base as long, the sides straight and converging rapidly toward the rounded and depressed apex which is more strongly depressed on the narrow submargins on either side before the lorae; sutures distinct and deep, together with the depressed apex providing a swollen appearance. Clypeus of the male basally, together with the apex of the front, swollen and bulging out over the lorae, the sutures obsolete. Lorae of the female broad and tumid, those of the male very much reduced, linear. Scutellum nearly impunctate. Elytra broad, moderately long, the second apical cell usually scarcely more than half as long as the middle antepical cell, broadly rounded at the apex, the veins strong.

Color: Female yellowish-green, immaculate; elytra greenish hyaline, the veins green. Male yellowish-green; elytra amber-brown, the veins concolorous, a broad black mark on each epimera, abdomen fulvous above, the tergites more or less fuscous. Wings whitish hyaline to smoky, the veins concolorous.

Specimens from Maine, Ontario, New York, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Kansas,

Colorado, Utah, and Oregon have been available for these studies. Van Duzee (11) also records the species from New Hampshire, Quebec, New Jersey, North Carolina and Missouri. This is apparently one of the most universally common species in North America. To date it has not been recorded west of Colorado. Specimens of both sexes from Josephine County, Oregon, F. W. Nuncnmacher collector, before the writer are indistinguishable from the form occurring in this locality. Several female specimens from the Sardine Canyon, Utah, D. M. De Long collector, have also been placed here.

In the past, *viridis* Fitch has been confused with other species with which it is commonly associated and which it resembles. The writer attributes the variations mentioned by others as resulting from the confusion, having found the species quite stable in its characters.

Host: Willow, *Salix longifolia* Muhl.

Location of type: Fitch collection, New York State Museum, Albany.

Nymphs: The nymphs, both males and females, imitate the adult in color. They are stout, with transverse head and convex thorax; the abdomen is broad and crested, each segment being elevated into a backward projecting tooth. They are found on the rapidly growing shoots of the host plant near the point of attachment of the leaves, where their color and shape afford them excellent means of concealment.

***Macropsis hesperia* sp. n.**

Resembles *viridis* Fitch in coloration, but smaller and more yellowish, the males distinctly tawny, and presenting rather pronounced structural differences. Length: female, 5 mm., male, 4.5 mm.; width: female, 1.6 mm., male, 1.35 mm.

Pronotum parabolically obtuse-angled before, strongly convex, anterior impressions scarcely as long as the long diameter of the eye; rugae, when compared with those of *viridis* very fine and indistinct, median line indicated in the male only; posterior margin with a shallow angulate incision, more deeply angulate in the male, more so than in *viridis*. Face somewhat tumid when viewed from the side, rugae and punctures very fine and indistinct. Clypeus of the female not so tumid as in *viridis*, as long as the basal width, sutures not so deep as in *viridis*, the sides straight and nearly parallel to the broad truncate apex which is depressed most strongly on the narrow submargins before the lorae; that of the male not tumid as in *viridis*, the sides distinct and parallel to near the base. Lorae of the female broad and

tumid, those of the male smaller, tumid. Scutellum impunctate. Elytra long and rather broad, broadly rounded at the apex, the veins weak.

Color: Female bright yellowish-green, immaculate; eyes fuscous. Elytra lactean-green, hyaline, the veins concolorous; wings whitish hyaline, the veins concolorous. Male distinctly fulvous or tawny above, shading to paler yellowish beneath, the epimera each bearing a prominent black spot. Abdomen with a distinct reddish cast above, the tergites guttate with fuscous anteriorly. Elytra pale amber-brown, the veins concolorous; wings pale smoky hyaline, the veins fuscous.

The above description is based on twenty-four specimens, twelve males and twelve females: Twelve from Blackfoot, Idaho, June 26, 1930, D. M. De Long collector; two from Shoshone Basin, Idaho, July 27, 1930, D. M. De Long collector; and ten from Alto, New Mexico, June 24, 1923, K. C. Doering collector. Holotype, female, Blackfoot, and allotype, male, same data, in the collection of D. M. De Long. Two paratypes, Shoshone Basin, and four paratypes, Blackfoot, three males and three females, also in the collection of D. M. De Long. Two paratypes, Blackfoot, and two, Alto, two males and two females, in the collection of Herbert Osborn; two paratypes, Blackfoot, male and female, and two, Alto, male and female, in the U. S. National Museum; two paratypes, Blackfoot, male and female, in the author's collection; and six paratypes, three males and three females, in the collections of the University of Kansas. The writer has also recognized this species from Colorado.

This species is unquestionably more closely related to *viridis* Fitch and *occidentalis* Van D. than to any others known to date. In fact, it might be considered a race or variety of *viridis*, as might also *occidentalis*. However, it presents definite structural characters, such as the shape of the pronotum, the fineness of the rugae, and the shape of the clypeus, together with other variations that render it distinct. The same is also true of *occidentalis*, and since both appear to be rather definitely restricted in their ranges and no intergrades have come to light, it is thought best to treat them as species. It is certain that they cannot be treated as color varieties.

Host: Probably Willow, *Salix* sp.

Macropsis occidentalis (Van D.).

Pediopsis occidentalis Van D., Psyche v, pp. 238-241, 1889.
Macropsis occidentalis Van D., Trans. San Diego Soc. Nat. Hist., ii, p. 52, 1914.

Resembles *viridis* Fitch in size and coloration, but coarser, rugae and punctures very coarse, the epimera of both sexes bearing sooty black spots. Length: female, 5 mm., male, 4.25 mm.; width: female, 1.75 mm., male, 1.5 mm.

Pronotum parabolically right-angled before, somewhat convex, anterior impressions as long as the long diameter of the eye; rugae, when compared with those of *viridis*, very coarse, coarser in the male, reticulate, median line present; posterior margin with a deep angulate incision. Face flat when viewed from the side, rugae and punctures coarse and distinct. Clypeus of the female as broad as long, the sides straight and converging apically, though more nearly parallel than in *viridis*, sutures deep and distinct; apex broadly depressed for its entire width. Clypeus of the male not tumid as that of *viridis*, the sides straight and parallel to the base, apex depressed as in the female. Lorae of the female broad and tumid, those of the male tumid though somewhat reduced. Scutellum shallowly punctate on the disc. Elytra broad and long, acutely rounded at the apex, veins strong.

Color: Female uniform dull greenish-yellow; elytra greenish hyaline, the veins concolorous; wings whitish hyaline, veins concolorous. Male colored much as the male of *viridis*, but darker; elytra amber-brown, the veins concolorous; head and thorax tawny, pronotum stained with fuscous; abdomen fulvous, the tergites guttate with fuscous, especially anteriorly. Epimera of both sexes marked with a sooty black spot.

Specimens before the writer are the types from Los Angeles County, California, Coquillett collector; and several from the San Jacinto Mountains of California, R. H. Beamer, collector. Van Duzee also records this species from Nevada. The specimens collected by R. H. Beamer show that the female, when living, is of a more definite green than museum specimens would lead one to think. This species resembles *viridis* Fitch in many ways. However, the coarse rugae and the spots on the epimera ought to separate the females at once from those of *viridis*; and the very coarse rugae and lack of tumidity of the clypeus and front ought to place the males.

The writer does not consider Van Duzee's discussion of the relationship of this species to the European forms altogether tenable, when viewed in the light of our accumulating knowledge of this interesting group. Also, it is quite evident in this instance, that he treated at least two species as *viridis* Fitch. Such a species as *punctifrons* Van D. lends itself more readily to such a discussion of faunistic relationships.

Host: Willow, *Salix* sp., according to Van Duzee.

Location of types: Iowa State College, Ames.

Macropsis suturalis (O. & B.).

Pediopsis suturalis Osborn and Ball, Proc. Dav. Acad. Nat. Sci., vii, p. 67, 1898.

Female green, clavus black; male sordid greenish, clavus black. Length: female, 5.5 mm., male, 5 mm.; width: female, 1.85 mm., male, 1.6 mm.

Pronotum right-angled before, moderately convex, elongate anterior impressions longer than the long diameter of the eye; rugae rather coarse, median line obsolete; posterior margin with a shallow angulate incision. Face concave before the eyes when viewed from the side, rugae and punctures fine and obscure. Clypeus of the female very broad, a little longer than the basal width, sides straight and parallel to the broadly rounded depressed apex which is most strongly depressed on the narrow submargins before the lorae; that of the male basally, together with the apex of the front, greatly swollen, the sides bulging out over the lorae, the sutures appearing obsolete. Scutellum scarcely punctate on the disc. Elytra rather long, broadly rounded at the apex, the veins weak.

Color: Female green, immaculate except for the black dorsal stripe which occupies the entire claval areas of the elytra and extends back to the apex. Wings whitish hyaline, the veins concolorous. Male sordid greenish which renders the black dorsal stripe less evident than in the female. Elytra smoky translucent, the same areas black as in the female; scutellum sordid greenish on the disc, each basal angle marked with a black triangle; pronotum and vertex deeply stained with fuscous; eyes reddish. Beneath paler, face stained with fuscous above, pleurites deeply stained with fuscous, epimera each bearing a sooty black dash, tergites of the abdomen black, the posterior margins narrowly yellowish. Wings smoky hyaline, the veins concolorous.

Specimens from Maine, Pennsylvania, Ohio, Iowa, Minnesota, Wisconsin and Kansas are before the writer. The Iowa series includes two cotype specimens. Van Duzee (11) also records this species from New York.

Host: Willow, *Salix amygdaloides* Anders., according to Ball (1).

Location of types: Collections of Herbert Osborn, E. D. Ball, and Iowa State College, Ames.

Nymphs: The nymphs are green in color and marked in general imitation of the adult. A black stripe arises behind either eye and runs back across the wing pads onto the abdomen, keeping just within the margin, to the caudal extremity. In size and shape, they resemble the nymphs of *viridis* Fitch.

Macropsis bicolor (Osb.).

Pediopsis bicolor Osborn, Me. Agr. Exp. Sta. Bull., 238, p. 90, 1915.

Brownish-black above, green below, the viridity fading to yellowish in older and museum specimens. Length: female, 5.5 mm., male, 5 mm.; width, 1.5 mm.

Pronotum right-angled before, moderately convex, anterior impressions as long or longer than the long diameter of the eye; rugae rather coarse, reticulate, median line indicated; posterior margin with a broad angulate incision. Face somewhat concave below the apex when viewed from the side, rugae and punctures fine and indistinct. Clypeus of the female a little longer than its basal width, sides straight and converging somewhat toward the rounded and depressed apex. Lorae broad and tumid. Clypeus of the male basally, together with the apex of the front, tumid, the sides bulging out over the lorae and nearly obscuring them, the sutures appearing obsolete. Scutellum finely punctate on the disc. Elytra rather long and narrow, the veins strong.

Color: Brownish-black above, the front shading to lighter at the middle, but changing rather abruptly to the viridity of the underparts. Beneath green, immaculate in the female except for a large fuscous spot on either side of the pygofer a little behind the middle; the male stained with fuscous, the extremities of the tibiae and the entire tarsi black. Epimera marked with a jet-black spot in the males only. In some specimens the pronotum is quite virescent as is also the upper half of the front. Scutellum dingy greenish on the disc, the basal triangles piceous. Elytra brownish-black, a faintly translucent spot near the apex in some specimens. Wings whitish hyaline, the veins concolorous.

The above description is based on several specimens from Orono, Maine, including a type, a large series of specimens from Ashtabula County, Ohio, one specimen from Birtle, Manitoba, several from Colorado, and one from Massachusetts.

Host: Broad-leaved Willows, *Salix* sp.

Location of types: Collection of Herbert Osborn, and Maine Agricultural Experiment Station, Orono.

Macropsis sordida (Van D.).

Pediopsis sordida Van D., Can. Ent., xxvi, p. 89, 1894.

Somber dirty green in color, the viridity fading. The least handsome species of the genus. Length: female, 5 mm., male, 4.5 mm.; width, 1.5 mm.

Pronotum broadly obtuse-angled before, weakly convex, anterior impressions shorter than the long diameter of the eye; rugae coarse, reticulate, median line indicated; posterior margin with a shallow

angulate incision. Face nearly flat when viewed from the side, rugae and punctures coarse. Clypeus of the female a trifle broader at the base than long, the sides straight and converging toward the rounded depressed apex, sutures distinct and deep. Clypeus of the male shorter than that of the female, somewhat tumid, the basal suture obsolete. Lorae of the female broad and tumid, those of the male very much reduced. Scutellum coarsely punctate on the disc, two large impressed points just anterior to the extremities of the transverse impression. Elytra broad and long, the veins strong.

Color: Green, darkly mottled and stained with fuscous which gives the insect a distinctly dirty appearance. The viridity of fresh or living individuals fades to a yellowish or cinereous hue characteristic of museum specimens. Elytra of the female hyaline, mottled and stained with fuscous, the veins concolorous; those of the male more uniformly deep smoky-brown, the veins concolorous. Disc of the scutellum, pronotum, vertex and face, especially the lower part of the face, greenish. Face stained with fuscous and deeply fuscopunctate. Basal angles of the scutellum shiny black. Beneath greenish, guttate with fuscous, the amount varying, the abdominal tergites narrowly pale posteriorly. The epimera each bear a broad black bar which is obscured by the general pigmentation of the insect. Wings smoky, the veins concolorous.

Numerous specimens from Idaho, Colorado, Ohio, Pennsylvania, Connecticut, Manitoba, and Alberta are at hand for these studies. The Colorado series includes the types. Occasionally the mottling of the elytra of certain females tends to become arranged in bands suggestive of those of *canadensis* Van D. The Ohio specimens, a large series of males and females, were taken from a thicket of mixed willows in Ashtabula County by the writer on June 24, 1931. The Idaho specimens, collected by D. M. De Long, at Ketchum, Alturas Lake, and Stanley Basin, are for the most part darker than the typical form, the pigment being evenly distributed and resulting in an almost uniform jet-black coloration. However, many of these specimens are indistinguishable from those of the type locality.

Van Duzee states that this species is closely allied to *tristis* Van D. The writer is unable to detect this relationship, but considers that it belongs to the willow inhabiting group of which *suturalis* O. & B. is a well known example.

Host: Willow, *Salix* sp.

Location of types: Iowa State College, Ames. An examination of the type series discloses that it contains specimens of three distinct species. However, Van Duzee marked only two specimens, a male and female, as types. These, and two others, belong to the same species and agree with his description

very nicely. The exceptions which he mentions are accounted for by the remaining specimens and his confusion.

***Macropsis canadensis* (Van D.).**

Pediopsis flavescens Van D., Ent. Am., v, p. 173, 1889.

Pediopsis canadensis Van D., Can. Ent., xxii, p. 111, 1890, (n. n. for *flavescens* Van D.)

Pale yellowish-green to greenish-fulvous, the males distinctly fulvous; elytra twice banded with brownish. Length: female, 5.25 mm., male, 4.75 mm.; width: female, 1.75 mm., male, 1.5 mm.

Pronotum obtuse-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae very fine and indistinct, reticulate, coarser in the male, median line obsolete; posterior margin with a deep angulate sinus. Face flat, or nearly so, when viewed from the side, rugae and punctures nearly obsolete. Clypeus of the female as broad as long, the sides nearly straight and converging toward the broadly rounded depressed apex, the sutures distinct; that of the male widened basally to where it joins the front, the sides bulging out over the lorae, sutures obsolete. Lorae of the female not so prominent as in many species, those of the male much reduced. Scutellum impunctate. Elytra long and rather narrow, broadly rounded at the apex, the veins strong.

Color: Head and thorax of the female yellowish-green or greenish-fulvous, immaculate, eyes concolorous, epimera unmarked, the abdomen fulvous, also immaculate. Elytra greenish hyaline, twice banded with brownish-fulvous, once near the middle, and again just before the apex, the veins concolorous. Wings whitish hyaline, the veins concolorous. Male fulvous or tawny, eyes red, epimera each bearing a large black spot. Lower part of the face and beneath paler, episternal pieces slightly stained with fuscous, tarsi black, tergites of the abdomen black. Scutellum cinereous, a brown triangle within either basal angle, a narrow red vitta down the center to the transverse impression which is also reddened. Elytra fulvohyaline, banded much as in the female. Wings smoky, the veins concolorous.

Numerous specimens from Maine, New York, Ontario, Michigan, Minnesota, British Columbia, Colorado, Utah, Idaho, New Mexico and California are available for these studies. Van Duzee also records the species from Quebec. The western examples have the face slightly more tumid and are more fulvous in coloration. Otherwise, they are indistinguishable from those of the type locality. This is a distinct and well marked species and should be easily placed. One well marked specimen from the collection of D. M. De Long is of special interest. It was taken in Fresno County, California, in July, 1919, by F. E. Blaisdell.

Host: Willow, *Salix* sp., according to the labels on various specimens.

Location of types: Iowa State College, Ames.

Macropsis rufoccephala Osb.

Macropsis scutellatus Osborn, (preoccupied by *Jassus scutellatus* Boh.), Ohio Biol. Surv. Bull., 14, iii, p. 218, 1928.

Macropsis rufoccephala Osborn, Ohio Jrl. Sci., xxxii (No. 6), p. 513, 1932, (n. n. for *scutellatus* Osb.).

Pale yellowish-green, head, pronotum, and anterior two-thirds of the scutellum reddish-brown. Length: female, 5.5 mm., width, 1.6 mm. Male unknown.

Pronotum broadly obtuse-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae fine, distinct, median line present; posterior margin with a rather deep angulate incision. Face concave below the vertex when viewed from the side, rugae and punctures fine but distinct. Clypeus of the female as wide at the base as long, the sides straight and converging toward the broadly rounded depressed apex. Lorae very broad and tumid. Scutellum distinctly punctate on the disc. Elytra broad and moderately long, broadly rounded at the apex, the veins weak.

Color: Pale yellowish-green, upper half of face, pronotum, and anterior two-thirds of scutellum reddish-brown. Basal angles of the scutellum usually blackish, the apical angle and a narrow margin adjacent to the elytra yellowish-green. Elytra lactean green, hyaline, the veins greenish. Wings whitish hyaline, the veins concolorous. Epimera unmarked.

Specimens of this species from Ohio, Wisconsin, Manitoba, Colorado, Idaho and California are before the writer. The Ohio series includes the three types. The California specimen, collected at Knight's Landing by D. M. De Long, bears a small black spot on each epimera by which it differs from all specimens known to date. In all other respects it is indistinguishable from individuals of the type locality. The Colorado specimens, Baker Collection in the U. S. National Museum, came labelled "*erythrocephala* G. & B." Following the treatment of *erythrocephala* G. & B., the writer will explain how such an error in determination probably came about. The name "*erythrocephala*" is more descriptive of this species than it is of the great majority of the insects to which it was applied. However, both species are entirely distinct and no difficulty should be experienced in placing them.

Host: Willow, *Salix* sp. A number of the Ohio specimens have been taken from this host. The writer found it on willows at Indian Lake and again in Delaware County.

Location of types: Collection of Herbert Osborn.

***Macropsis ferruginoides* (Van D.).**

Pediopsis ferruginoides Van D., Ent. Am., v, p. 171, 1889.

Ferruginous above, lower half of face and all beneath yellow, costa narrowly yellowish, a transverse hyaline band before the apex, epimera each bearing a heavy black spot. Length: female, 5.5-6 mm., male, 5 mm.; width, 1.8 mm.

Pronotum right-angled before, strongly convex, the apex somewhat tumid, anterior impressions as long as the long diameter of the eye; rugae fine but distinct, median line present; posterior margin with a deep angulate sinus. Face concave above when viewed from the side, rugae and punctures closely set, not very distinct. Clypeus of the female as long as the basal width, the sides straight and nearly parallel to the truncate depressed apex; that of the male widened basally, the basal suture obsolete. Lorae of both sexes prominent, tumid. Scutellum finely punctate on the disc. Elytra rather long and narrow, the apex acutely rounded.

Color: Ferruginous above, lower half of face and all beneath yellowish. Pronotum a little darker on the disc, a series of fuscous spots behind either eye of the male. Scutellum often with five yellow spots: two triangular areas within the basal angles, two circular ones just anterior to the transverse suture, and, less frequently, a triangle at the apex. These spots appear best in darker specimens. Elytra ferruginous, opaque, costa narrowly yellowish, a transverse hyaline band before the apex which includes the crossveins at the bases of the antepical cells. Wings whitish hyaline, the veins concolorous. Beneath yellowish, immaculate except for the large sooty black spot with which the epimera of both sexes are marked.

Specimens from Ohio, Indiana, Iowa, Minnesota, Montana, South Dakota, Nebraska, Kansas, Colorado, and New Mexico have been studied in the preparation of this description. This species is very closely related structurally to *erythrocephala* G. & B., though distinctly and specifically colored.

Host: Narrow-leaved Willows, *Salix* sp., probably *interior* Rowlee.

Location of types: Iowa State College, Ames, and U. S. National Museum.

Nymphs: The nymphs are yellow and brown in general imitation of the adult. Head and pronotum yellowish, rest of the body brown with a transverse band across the wing pads and another across the abdomen. The writer found this species developing on the Sand Bar Willow near the University Bridge, Columbus, Ohio, in June, 1931.

Macropsis erythrocephala (G. & B.).*Pediopsis erythrocephala* Gill. & Bak., Hemip. Colo., p. 72, 1895.

Male cinereous-brown to brownish-green, distinctly marked with fuscous; female green, enlivened anteriorly with fulvous, almost immaculate; epimera of both sexes each bearing a heavy black mark. Length: female, 6 mm., male, 5 mm.; width: female, 2 mm., male, 1.6 mm.

Pronotum broadly obtuse-angled before, strongly convex, the apex tumid, anterior impressions as long as the long diameter of the eye; rugae very fine, reticulate, median line indicated; posterior margin with a deep angulate incision. Face distinctly concave beneath the apex, rugae and punctures fine and indistinct. Clypeus a little longer than broad, the sides straight and nearly parallel, apex depressed and roundly truncate. Lorae broad and tumid. Scutellum almost impunctate. Elytra long and broad, broadly rounded at the apex.

Color: Female green, almost immaculate, enlivened with fulvous anteriorly; eyes reddish-brown, legs green, shading to fulvous basally. Epimera each bearing a large black spot. Elytra pale greenish hyaline, the veins darker. Male cinereous brown to brownish-green, distinctly marked with fuscous. Face fulvous, stained with fuscous, heavier above; beneath fuscous, enlivened with fulvous, the posterior margins of the abdominal segments narrowly fulvous; legs fulvous, often stained with fuscous, tarsi blackish; epimera each bearing a large black spot. Pronotum testaceous brown, deeply stained with fuscous centrally, the anterior impressions guttate with black. Scutellum testaceous brown, a black triangle in either basal angle. Elytra fuscohyaline, the veins darker.

Numerous specimens from Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Nebraska, Kansas, Colorado, New Mexico, and California are before the writer. The females are consistently colored as described. However, males from Iowa, Colorado and Arizona are somewhat smaller and lighter, in some instances little darker than the females. In a series of nearly forty specimens from various parts of Ohio, not a single light colored male appears. Through the kindness of Professor C. P. Gillette the writer has been permitted to examine a female specimen of this species from the type locality which was pronounced as typical. This specimen has the rusty-brown coloration on the head and prothorax quite pronounced. It was doubtless such specimens as this which suggested the species' name. However, in the writer's experience, such specimens are not at all common. This species is one of the largest of the genus and very distinct.

Host: Willow, *Salix longifolia* Muhl.

Location of types: The types seem to be lost. The type in the National Museum at Washington does not bear the labels designated in the original description and belongs to a different species than that to which it is credited. Professor Herbert Osborn was kind enough to make some comparisons for the writer while in Washington. As a result of these comparative studies, we find that the National Museum specimen belongs to his *scutellatus* which has been renamed *rufocephala*. This discovery accounts for the fact that specimens of *rufocephala* from the National Museum came labelled *erythrocephala* G. & B. Since these species differ greatly in both form and distinctive markings, there should be little cause for confusing them.

***Macropsis pallida* sp. n.**

Pale greenish-white, immaculate except for the sooty black spot with which each epimera is marked. Length: female, 5.5 mm., width, 1.8 mm. Male unknown.

Pronotum parabolically obtuse-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae very fine, reticulate, median line indicated; posterior margin with a rather shallow angulate sinus. Face distinctly tumid when viewed from the side, rugae and punctures fine and indistinct. Clypeus of the female a little longer than wide, the sides straight and parallel, the apex depressed, most strongly on the narrow submargins before the lorae. Lorae broad, moderately tumid. Scutellum finely rugose on the disc, the basal angles smooth. Elytra broad and long, thin, the veins thickened basally.

Color: Pale greenish-white. Elytra whitish hyaline, the veins greenish basally. A creamy white triangle within either basal angle of the scutellum. Eyes reddish. Legs enlivened with fulvous, chiefly the femora, the outer ends of the tibiae and the tarsi. Epimera each bearing an oval black spot.

Description based on ten female specimens: Eight, Boise, Idaho, July 11, 1930, D. M. De Long collector; holotype and three paratypes in the collection of D. M. De Long, two paratypes in the U. S. National Museum, one in the collection of Herbert Osborn, and one in the writer's collection. One, Logan Canyon, Utah, July 24, 1930, D. M. De Long collector, in the collection of D. M. De Long. One, Davis, California, June 6, 1922, B. G. Thompson collector, in the collection of Herbert Osborn.

Host: Unknown.

Macropsis cinerea sp. n.

Cinereous brown above, greenish-fulvous beneath; elytra cinereous hyaline, the veins infuscated, a black triangle within either basal angle of the scutellum, epimera each bearing a large black spot. Length: female, 5 mm., width, 1.5 mm. Male unknown.

Pronotum parabolically obtuse-angled before, slightly convex, anterior impressions shorter than the long diameter of the eye; rugae fine, reticulate; posterior margin with a very shallow angulate sinus. Face tumid when viewed from the side, rugae and punctures fine and indistinct. Clypeus longer than the basal width, the sides straight and strictly parallel to the broadly rounded apex which is not depressed. Lorae broad, but scarcely tumid. Scutellum impunctate. Elytra broad and long, narrowly rounded at the apex, the veins strong.

Color: Cinereous brown above, elytra cinereous hyaline, the veins infuscated, a black triangle within either basal angle of the scutellum, pronotum stained with fuscous, eyes black. Face and beneath greenish-fulvous, immaculate except for the heavy black spots on the epimera. Dorsal surface of the abdomen guttate with fuscous, especially anteriorly on the segments. Wings smoky hyaline, the veins fuscous.

Description based on one female specimen collected by the writer at Indian Lake, Ohio, on July 3, 1931. Holotype in the collection of Herbert Osborn.

Host: Willow, *Salix* sp.

Macropsis delongi sp. n.

Resembles *ferruginoides* Van D. in coloration, but of a different form, belonging to a different morphological group. Length: female, 5.25 mm., width, 1.8 mm. Male unknown.

Pronotum parabolically obtuse-angled before, moderately convex, anterior impressions as long as the long diameter of the eye; rugae fine, reticulate, indistinct, median line obsolete; posterior margin with a shallow oval incision. Face somewhat concave before the eyes when viewed from the side, rugae and punctures fine and indistinct. Clypeus as broad at the base as long, the lateral margins straight and converging toward the broadly rounded apex which is depressed on the submargins before the lorae. Lorae broad and only slightly tumid. Scutellum almost impunctate. Elytra broad and long, the apex, narrowly rounded, veins strong.

Color: Entire body, except the eyes and elytra, pale greenish-yellow, immaculate. Eyes dark fuscous. Elytra dark reddish-brown, opaque except for a transverse hyaline band before the apex which includes the apical fourth of the clavus. Wings pale smoky hyaline, the veins fuscous.

Description based on four female specimens collected by D. M. De Long in Idaho; three, Idaho City, July 13, 1930, and one, Boise, July 11, 1930. Holotype, Idaho City, and paratype, Boise, in the collection of D. M. De Long; a paratype in the collection of Herbert Osborn, and one in the U. S. National Museum.

The writer takes great pleasure in naming this distinctive species in honor of Dr. D. M. De Long, whose recent collecting in the west has brought to light many new species and has added much to our knowledge of the distribution of others.

Host: Unknown.

***Macropsis aurifera* sp. n.**

Dark yellowish-green, the elytra golden brown; immaculate. Length: female, 5.3 mm., width, 1.8 mm. Male unknown.

Pronotum right-angled before, moderately convex, anterior impressions shorter than the long diameter of the eye; rugae fine and reticulate, median line wanting; posterior margin with a moderately deep angulate sinus. Face slightly tumid when viewed from the side, rugae and punctures fine but rather distinct. Clypeus of the female as broad at the base as long, the sides straight and converging rapidly toward the rounded apex which is depressed on the narrow submargins before the lorae. Lorae of moderate width and tumidity. Scutellum finely punctate on the disc, a median carina indicated. Elytra broad and short, exceeding the end of the ovipositor by only half the length of the apical cell, veins strong.

Color: Dark yellowish-green, immaculate. Eyes black. Elytra golden brown, pellucid, the veins concolorous. Epimera unmarked. Wings smoky hyaline, the veins darker.

Description based on six female specimens from Idaho: Five from Idaho City, July 13, 1930, and one from Boise, July 11, 1930, D. M. De Long collector. Holotype, Idaho City, and paratypes in the collection of D. M. De Long, paratype in the U. S. National Museum, one in the collection of Herbert Osborn, and another in the author's collection.

Host: Probably Willow, *Salix* sp.

***Macropsis osborni* sp. n.**

Resembles *basalis* Van D. with which it has been confused, but very much larger and of a different form, the elytra unmarked except for a broad black band bordering the scutellum. Length: female, 6 mm., male, 5 mm.; width: female, 1.8 mm., male, 1.75 mm.

Pronotum parabolically obtuse-angled before, moderately tumid anteriorly, the anterior impressions longer than the long diameter of the eye; rugae fine, reticulate, those of the males coarser, median line obsolete or nearly so in the females, present in the males; posterior margin with a shallow oval incision. Face roundly tumid when viewed from the side, rugae and punctures coarse and shallow. Clypeus of the female longer than the basal width, the sides straight and parallel, the apex broadly rounded, not depressed; that of the male shorter, the basal suture obscured. Lorae of the female very broad and only moderately tumid, those of the male prominent and tumid. Scutellum nearly impunctate. Elytra long and rather narrow, apex narrowly rounded, the veins strong.

Color: Female yellowish-green; the elytra greenish hyaline, burnished over with a cupreous cast that is most pronounced on the veins, a broad black band bordering the scutellum which is confined to the bases of the claval areas. Beneath immaculate, the epimera unmarked, occasionally bearing an inconspicuous spot. Wings whitish hyaline, the veins faintly smoky. Males greenish, overcast with fuscous; the elytra cinereous hyaline, enlivened with fulvous, most pronounced on the veins, a broad blackish band bordering the scutellum as in the female. Pronotum stained with fuscous, centrally and basally. Each basal angle of the scutellum marked with a large fuscous triangle, the transverse impression fuscous. Beneath immaculate except for the sooty black spot with which each epimera is marked. Dorsal surface of the abdomen infuscated, chiefly anteriorly on the segments. Wings hyaline, the veins smoky.

The above description has been drawn from eighteen specimens, two males and sixteen females: Holotype, Arcanum, Ohio, June 13, 1904, cottonwood, O. H. Swezey collector; allotype, male, same data; paratypes; Ames, Iowa, July 2, 1897; Ft. Collins, Colorado, August 6, 1895; all in the collection of Herbert Osborn. Paratypes: male, Rapid City, South Dakota, June 24, 1923; female, same data; and female, Newell, South Dakota, June 18, 1923, H. C. Severin collector; in the collection of D. M. De Long. Two; Willow Springs, Illinois, June 29, 1913, poplar, W. J. Gerhard collector, in Mr. Gerhard's collection. Three; Colorado, C. F. Baker collection, U. S. National Museum: "Colo. 1584," "Colo. 1563," and "Colo. 1589," in the U. S. National Museum. Three: two, Gray Cloud Island, Minnesota, July 12, 1929, H. H. Knight collector, and one, Ottawa County, Kansas, P. B. Lawson collector; in the collections of the University of Kansas. Two: Ames, Iowa, June 27 and July 12, 1897, in the Iowa State College collections. One, Delaware County, Ohio, July 7, 1931, cottonwood, E. P. Breakey collector, in the author's collection.

The writer takes great pleasure in naming this large and distinctive species in honor of his teacher and benefactor, Herbert Osborn.

Host: Cottonwood, *Populus deltoides* Marsh.

Macropsis nigricans (Van D.).

Pediopsis trimaculata Van D., Ent. Am., p. 172, 1889, (description).

Pediopsis bifasciata O. & B., Proc. Dav. Acad. Nat. Sci., vii, p. 118, 1898.

Macropsis nigricans Van D., Check List Hemip., p. 64, 1916, (n. n. for *trimaculata* Van D.).

Greenish-fulvous to greenish-brown, the viridity quickly fading, with heavy black markings on the basal halves of the elytra and again at the apices; males pale yellowish with the elytra less distinctly marked. Length: female, 5.5 mm., male, 5 mm.; width: female, 1.8 mm., male, 1.6 mm.

Pronotum right-angled before, scarcely convex; rugae coarse and reticulate, median line well defined; anterior impressions shorter than the long diameter of the eye; posterior margin with a shallow angulate sinus. Face somewhat tumid when viewed from the side, rugae and punctures shallow and indistinct. Clypeus of the female longer than its basal width, the sides straight and parallel to the broadly rounded apex which is only slightly depressed on the narrow submargins before the lorae; that of the male much widened toward the base, the sides straight to the rounded apex which is depressed on a narrow submargin from one lora to the other. Lorae prominent and tumid, less so in the male. Scutellum finely punctate on the disc. Elytra broad and long, apex narrowly rounded, the veins weak.

Color: Greenish-fulvous to greenish-brown above, the markings black. Pronotum more or less stained with fuscous, the anterior impressions usually maculate with brown or brownish-black. Scutellum greenish-fulvous, a black or brown triangle within either basal angle, and usually a pair of impressed black points just anterior to the extremities of the transverse impression. Elytra hyaline, a variable amount of black or brownish-black on the basal halves which is usually concentrated along the costa, sometimes spreading to, or onto, the clavus, and a triangular patch at the apex, pointed in the antepical cells. Face and beneath pale yellowish or yellowish-green, immaculate except for the heavy black spots with which the epimera are marked. Abdominal tergites of the male black, the posterior margins narrowly yellow, those of the female guttate with blackish in very dark specimens. Wings pale smoky hyaline, the veins fuscous.

Specimens from Iowa, South Dakota, Colorado, Nebraska, Illinois, and Ohio are before the writer. Van Duzee also records this species from Ontario and New York. These insects vary considerably in the amount of impigmentation present, but not much in color pattern which is essentially

that described. Specimens taken in Ohio are much darker than those from South Dakota and Colorado. This same condition holds for other species, the darker phases coming from the more humid regions.

Host: Cottonwood, *Populus deltoides* Marsh. The writer found this species developing on cottonwood near the University Bridge at Columbus, Ohio, in May, 1931, and again at Westerville, Ohio. Osborn and Ball also observed it developing on this host.

Nymphs: The nymphs are robust and depressed, the abdomen not elevated into a crest as in the nymph of *viridis* Fitch, but having the general morphological features of those of *tristis* Van D. They are darkly pigmented above, the coloration suggesting that of the adult. A comparison of the nymphs of this species with those of *tristis* Van D. reveals many striking similarities. They were found on the twigs of a previous season's growth in the axils of the leaves, where their shape and coloration rendered them inconspicuous. When disturbed they would dodge around to the opposite side of the branch, refusing to leap under ordinary provocation.

The above synonymy indicates that there is considerable confusion regarding this species and Van Duzee's *bifasciata*. The specimens which Osborn and Ball described as *bifasciata* are before the writer and agree very nicely with the description which Van Duzee wrote supposedly for Fitch's *trimaculata*. Later, recognizing his mistake, Van Duzee proposed the name *nigricans* for the species which he had earlier described as *trimaculata* Fitch.

It has been possible to check the above described insects against the type of *bifasciata* and a considerable number of specimens from Wisconsin, South Dakota, Pennsylvania, and Maine. The Maine specimens had been determined *bifasciata* by Osborn with some hesitancy, since they did not agree with the insects from Iowa which he and Ball had treated as *bifasciata*. This comparison makes it certain that these insects represent a different species than the Iowa and Ohio specimens. Further study also reveals that Van Duzee's description of *bifasciata* fits the type very nicely, and that he likewise described the insects from Wisconsin, South Dakota, Pennsylvania, and Maine.

In the description of *trimaculata*, referred to above, Van Duzee makes this statement: ". . . clavus deep brown;

corium pale grayish white, a large patch near the middle scarcely reaching the claval suture, and extending along the costa to the shoulder, and a transverse band near the apex, brown." At the same time he described his *bifasciata* as: "Elytra whitish hyaline with a transverse fuscous band, displaced on the claval suture, crossing near their middle, and another just before their apex; nervures concolorous." It will be noted that no mention is made of any brown markings on the elytra of *bifasciata* that extend along the costa to the shoulder. Nor is the clavus described as being deep brown. Such markings do not appear in any of the specimens before me which have been determined as *bifasciata*. However, the transverse band which is displaced at the claval suture is distinct and quite uniform throughout the series, as is also the transverse band before the apex. Specimens of *bifasciata* are more robust in appearance than those of *nigricans*, the angle of the pronotum anteriorly is much greater, giving the head a shorter appearance.

Macropsis bifasciata (Van D.).

Pediopsis bifasciata Van D., Ent. Am., v, p. 173, 1889.

Dull greenish-ferruginous, the viridity fading, paler beneath, elytra grayish hyaline, narrowly bifasciate with fuscous. Length: female, 5.25 mm., male, 5 mm.; width: female, 1.9 mm., male, 1.75 mm.

Pronotum broadly obtuse-angled before, scarcely convex, anterior impressions shorter than the long diameter of the eye; crenulate punctations fine, coarser in the males, median line wanting; posterior margin with a shallow angulate incision. Face rather tumid when viewed from the side, rugae and punctures very fine and obscure. Clypeus of the female narrow, longer than the basal width, the sides straight and converging toward the rounded apex which is slightly depressed on the narrow submargins before the lorae; that of the male basally, together with the apex of the front, swollen and polished, the sides bulging out over the lorae. Lorae of the female conspicuous and rather tumid, those of the male reduced and inconspicuous. Scutellum scarcely punctate on the disc. Elytra long, narrowly rounded at the apex, the veins strong.

Color: Pronotum often stained with fuscous on the disc and posteriorly, sometimes appearing fuscopunctate, the anterior impressions sometimes infuscated. Face and beneath pale honey-yellow, greenish in fresh specimens, immaculate except for the large sooty-black spots on the epimera. Scutellum fuscopunctate on the disc, a black triangle within either basal angle. Abdominal tergites of the female often

guttate with fuscous, those of the male black, the posterior margins narrowly yellowish. Elytra of the female grayish hyaline, an oblique transverse band crossing near the middle, interrupted at the claval suture; and another, transverse, just before the apex; veins concolorous. Elytra of the males fuscohyaline, immaculate. Wings of the female pale smoky hyaline, veins fuscous; those of the male smoky, the veins concolorous.

A considerable number of specimens taken in Maine, Pennsylvania, Wisconsin, Minnesota, South Dakota, Colorado, and the type from Muskoka, Ontario, were examined in the preparation of this description. Van Duzee (11) also records this species from Quebec, New York, and Iowa. The Iowa record seems to be on the authority of Osborn and Ball. The reasons for considering this an error are given in the discussion of the synonymy of *nigricans* Van D.

Host: Poplar, *Populus* sp., probably *tremuloides* Michx.

Location of type: Iowa State College, Ames.

Macropsis tristis (Van D.).

Pediopsis tristis Van D., Can. Ent., xxii, p. 249, 1890.

Cinereous-brown above, yellowish-green below; face with a black band above and a large black spot below; veins of the elytra strong, light in color and narrowly margined with fuscous. Length: female, 5.5 mm., male, 4.75 mm.; width: female, 2 mm., male, 1.8 mm.

Pronotum right-angled before, scarcely convex, anterior impressions as long as the long diameter of the eye; rugae very coarse and strongly oblique, median line present; posterior margin with a rather deep angulate sinus. Rugae and punctures of the face coarse, punctures next the eye very coarse. Clypeus rather narrow, longer than the basal width, the sides straight and converging toward the broadly rounded much depressed apex. Lorae very broad, each as broad, horizontally, as the clypeus, tumid. Scutellum coarsely punctate on the disc. Elytra very broad and long, broadly rounded at the apex, the veins strong.

Color: Pronotum cinereous, the anterior impressions and between the rugae fuscous. Scutellum cinereous, fuscopunctate, a black triangle within either basal angle. Face cinereous, a band extending across the superior margin, running down to a point near the middle and emphasized as spots above the ocelli, and a large circular spot below, black. Beneath yellowish-green, epimera slightly fuscous, episternal and triangular pieces piceous, legs mottled and striped with fuscous. Elytra cinereous hyaline, the veins pale, evenly and narrowly margined with fuscous. Wings pale smoky hyaline, the veins fuscous.

Specimens from Ohio, Illinois, Iowa, Missouri, Kansas, and Colorado are before the writer. Van Duzee (11) also records the species from Pennsylvania. The Iowa series contains two cotype specimens.

Host: Wild plum, *Prunus* sp., probably *americana* Marsh.

Location of types: Collections of Herbert Osborn and Iowa State College, Ames.

Nymphs: The writer found this species developing in a plum thicket in Ashtabula County, Ohio, in June, 1931. The nymphs are stout and depressed, with transverse head, the abdomen broad and flattened, lacking the crest of the nymphs of *viridis* Fitch. They are colored in general imitation of the adult: reddish-brown, marked with white along the sutures, with four light spots on the thorax arranged in the form of a square, the face bearing a large black spot as in the adult, the body clothed with fine white hairs which produce a light reflection. Structurally these nymphs bear a striking resemblance to those of certain Membracids.

***Macropsis robusta* sp. n.**

Robust in appearance; castaneous to greenish-fulvous in color; face, pronotum, and scutellum fuscopunctate. Length: female, 5 mm., male, 4.5 mm.; width: female, 2 mm., male, 1.6 mm.

Pronotum broadly obtuse-angled before, moderately convex; coarsely and deeply crenulate punctate, median line usually present, anterior impressions shorter than the long diameter of the eye; posterior margin bearing a deep angulate sinus. Face nearly flat when viewed from the side, thickly set with rather coarse and deep punctures. Clypeus of the female broader at the base than long, sides straight and converging rapidly toward the narrowly rounded depressed apex; that of the male basally, together with the apex of the front, strongly tumid, the sides bulging out over the lorae. Lorae of the female broad and tumid, those of the male nearly hidden, reduced to mere lines. Scutellum deeply punctate on the disc. Elytra subcoriaceous, coarsely punctured, broad and rather short, broadly rounded at the apex, the veins weak.

Color: Castaneous to greenish-fulvous. Face fulvous, thickly fuscopunctate. Beneath pale greenish-yellow, nearly immaculate, pleural pieces somewhat stained with fuscous. Pronotum fulvous, coarsely fuscopunctate. Scutellum fulvous, fuscopunctate on the disc, basal angles castaneous, a pair of large round yellowish spots just anterior to the extremities of the transverse impression. Elytra castaneous, pellucid, the veins concolorous. Dorsal surface of abdomen fuscous,

the posterior margins of the segments narrowly yellowish, eighth segment of female usually entirely pale. Wings whitish hyaline, the veins smoky.

Description based on nine specimens, one male and eight females: Holotype, female, Cranberry Lake, New York, July 20, 1917, C. J. Drake collector; allotype, male, same data, in the collection of Herbert Osborn. Paratypes: Saddleback Lake, Maine, July 18-20, 1916, Herbert Osborn collector; Orono, Maine, July 2, 1913, Herbert Osborn collector; Sault Saint Marie, Canada, July-August, 1904, also in the collection of Herbert Osborn. Paratype, Charter Oak, Pennsylvania, June 18, 1918, J. N. Knull collector, in the collection of D. M. De Long. Paratypes: Sault Saint Marie, Canada, July-August, 1904, and Highmoor, Maine, August 15, 1913, Herbert Osborn collector, in the U. S. National Museum. Paratype, Orono, Maine, July 3, 1914, Herbert Osborn collector, in the author's collection.

Host: Unknown.

***Macropsis basalis* (Van D.).**

Pediopsis basalis Van D., Ent. Am., v, p. 171, 1889.

Robust in form; head and thorax of female ferruginous above, greenish below and posteriorly, a broad black band on the bases of the elytra bordering the scutellum and often more or less distinctly twice banded with fuscous in addition; male smoky ferruginous, elytra dark amber, black basally as in the female. Length: female, 5 mm., male, 4-4.25 mm.; width: female, 1.75 mm., male, 1.3 mm.

Pronotum parabolically obtuse-angled before, moderately convex, anterior impressions scarcely as long as the long diameter of the eye; rugae fine and indistinct, reticulate, those of the male coarser, appearing more as deep punctures, median line indicated; posterior margin with a shallow angulate incision. Face somewhat tumid when viewed from the side, rugae and punctures indistinct. Clypeus of the female nearly as broad as long, sides converging toward the broadly rounded apex which is depressed slightly on the narrow submargins before the lorae, the sutures distinct; that of the male, basally, together with the apex of the front, tumid, the sides bulging out over the lorae, the sutures obsolete. Lorae of the female tumid and prominent, those of the male very much reduced and inconspicuous. Scutellum finely punctate on the disc. Elytra broad and long, broadly rounded at the apex, the veins weak.

Color: Female olive green, upper part of face, pronotum, and scutellum ferruginous. Elytra greenish hyaline, a broad black band

in the base of the clavus margining the scutellum and often more or less distinctly twice banded with fuscous in addition. Beneath greenish, immaculate, the epimera unmarked. Male smoky ferruginous. Elytra dark amber, black basally as in the female. Vertex and pronotum fuscopunctate, scutellum fuscopunctate on the disc, a brown triangle within either basal angle. Beneath yellowish-green, immaculate except for the large sooty-black spots with which the epimera are marked.

Specimens from Maine, New Hampshire, New York, Pennsylvania, Michigan, Ohio, Wisconsin, Minnesota, Idaho, Utah, Ontario, and British Columbia are at hand for the preparation of this description. The Ontario specimen is the type from Muskoka Lake. Van Duzee (11) also records the species from Quebec, Iowa, and Colorado. The Iowa record is apparently on the authority of Osborn and Ball. Specimens of the insect which they secured from cottonwood at Ames are before the writer and represent a species described here as new, namely, *osborni* sp. n.

As pointed out by Osborn and Ball, the differences in the coloration of the elytra of the females seems to be due to a localization of the pigment, the basal band becoming darker as the brown disappears from the remainder of the elytra. The males exhibit no such variation in coloration. It would be difficult to separate the males from those of similar appearance were it not for the very broad clypeus and its characteristic shape. The writer was fortunate enough to collect a good series of both males and females of this species, some in copula, from an isolated stand of quaking aspen in a marsh meadow near Hudson, Ohio, during the summer of 1931. Thus males of known identity were secured; and upon learning their peculiarities, it has been possible to recognize them in other collections.

Host: Quaking Aspen, *Populus tremuloides* Michx.

Location of type: Iowa State College, Ames.

Macropsis fumipennis (G. & B.).

Pediopsis fumipennis Gill. & Bak., Hemip. Colo., p. 73, 1895.

Pediopsis crocea O. & B., Proc. Dav. Acad. Nat. Sci., vii, p. 68, 1898.

Green or yellowish-green, pronotum and scutellum tinged with smoky-brown, elytra deep smoky-brown, the costal margin greenish, epimera unmarked. Length: female, 4.75 mm., male, 4-4.25 mm.; width: female, 1.5 mm., male, 1.5 mm.

Pronotum parabolically obtuse-angled before, strongly convex, anterior impressions as long as the long diameter of the eye; rugae coarse, reticulate, median line present; posterior margin with a deep

ovoid incision. Face slightly tumid when viewed from the side, rugae and punctures fine and indistinct. Clypeus of the female broad, as broad at the base as long, sides straight on the basal two-thirds, converging slightly toward the rounded apex; that of the male, together with the lower part of the front, tumid, blending imperceptibly into the front, the sides bulging out over the lorae, nearly obscuring them. Lorae of the female tumid, prominent, those of the male reduced to mere lines. Scutellum coarsely punctate on the disc, basal angles shagreened, apical angle longitudinally and coarsely rugose. Elytra strong, broad and moderately long, broadly rounded at the apex, the veins weak.

Color: Nearly black above, costa broadly yellowish-green; beneath, yellowish-green, immaculate, epimera unmarked. Pronotum yellowish-green, clouded with fuscous on the disc, anterior impressions immaculate. Disc of scutellum heavily fuscopunctate, enlivened with greenish or yellowish, two large round impressed greenish or yellowish spots just anterior to the transverse impression, the basal triangles piceous. Elytra blackish or brownish-black, nearly opaque, changing to greenish or yellowish-green along the costa. Wings smoky, the veins fuscous.

The above description is based on a large series of specimens from Ohio and Kentucky. The Kentucky specimens are eight of the types of *crocea* O. & B. The writer had suspected that *crocea* O. & B. was the same species as *fumipennis* G. & B., so he sent specimens which he had determined as *crocea* to Washington, D. C. with Dr. Herbert Osborn, who was kind enough to compare them with the type of *fumipennis* in the National Museum. Dr. Osborn states that these specimens agree with the type of *fumipennis*; and since they are indistinguishable from the types of *crocea*, *fumipennis* G. & B. must be the same species as *crocea* O. & B. As a result of these studies the writer has decided to treat *gleditschiae* O. & B. as a color variety of *fumipennis*, since no morphological basis for separating them can be found. Numerous collections made from the Honey Locust in Ohio have brought to light only a few female specimens of the lighter phase.

Host: Honey Locust, *Gleditschia tricanthos* L.

Location of type: U. S. National Museum, Washington.

Nymphs: The nymphs are green, more or less overcast with fuscous, resembling those of *viridis* Fitch, and exhibiting their generic characteristics in the earliest instars. They are short and stout, with transverse head, convex thorax, and broad crested abdomen, each segment of which is elevated into a flat curved tooth projecting backward and tipped with a hair. The coloring of this insect is admirably suited to that of the

host plant, enabling it to blend nicely into its background, thus providing concealment. The leafhoppers are usually found on the leaf stalks and on the smaller branches.

***Macropsis fumipennis* var. *gleditschiae* (O. & B.).**

Pediopsis gleditschiae Osb. & Ball, Proc. Dav. Acad. Nat. Sci., vii, p. 68, 1898.

Differs from *fumipennis* G. & B. only in its lighter color, being almost uniformly yellowish-green, the elytra somewhat smoky, especially in the males.

Morphologically, this form seems to differ not at all from *fumipennis*.

Color: Female bright green, more or less overcast with fuscous, elytra hyaline apically. Males green, the elytra clouded with brownish or fuscous. Pronotum and scutellum often clouded with fuscous in darker specimens. Epimera unmarked in either sex.

Specimens before the writer are from Iowa, Tennessee, Louisiana, Nebraska, Kansas, and Idaho. The Iowa series includes a considerable number of the types. These insects vary considerably in the amount of smokiness or fuscous coloring matter present. The Louisiana specimens, males and females, Baker Collection, U. S. National Museum, C. R. Pilate collector, are from Opelousas. They are slightly smaller than the Iowa types, though otherwise indistinguishable. Both males and females are of the same shade of green with the same amount of fuscous overcasting. In the absence of host data, it is thought best to place them here. The Idaho specimens, a large series from near Twin Falls, D. M. De Long collector, have been placed here. Structurally, they are very close to the types, but are somewhat darker in color and distinctly yellow where the types are green. They were collected in the canyon immediately above Shoshone Falls. In the absence of host data it is impossible to more accurately place them at this time. Van Duzee (11) also records *gleditschiae* from Pennsylvania and Missouri.

Host: Honey Locust, *Gleditschia tricanthos* L.

Location of types: Collections of Herbert Osborn, E. D. Ball, and Iowa State College, Ames.

***Macropsis confusa* sp. n.**

Resembles *viridis* Fitch with which it has been confused, but smaller and of a different form and coloration; both male

and female lactean-green, immaculate, the elytra faintly smoky. Length: female, 4.75 mm., male, 4 mm.; width: female, 1.45 mm., male, 1.35 mm.

Pronotum obtuse-angled before, moderately convex, anterior impressions shorter than the long diameter of the eye; rugae very fine and indistinct, finer than those of *viridis*, median line obsolete; posterior margin with a shallow angulate incision. Face distinctly tumid when viewed from the side, rugae and punctures nearly obsolete. Clypeus of the female a little broader at the base than long, the sides nearly straight and converging rapidly toward the broadly rounded apex, the entire clypeus having the appearance of having been depressed between the lorae and anterior coxal pieces; that of the male but slightly swollen and merging imperceptibly with the front, the sides deviating immediately from the apex, almost obliterating the lorae. Lorae of the female tumid and shiny, those of the male reduced to mere lines. Scutellum impunctate on the disc. Elytra broad and short, acutely rounded at the apex, the veins weak.

Color: Both male and female are pale lactean-green, immaculate, the elytra faintly smoky. Wings whitish hyaline, the veins concolorous.

Description based on seventeen specimens, one male and sixteen females. Holotype, female, Greenfield, Pennsylvania, July 20, 1920, D. M. De Long collector, and allotype, same data, in the collection of D. M. De Long. Two paratypes, Charter Oak, Pennsylvania, J. N. Knull collector, one on July 8, 1919, and the other July 5, 1920, also in the collection of D. M. De Long. Eight paratypes, Orono, Maine, July 28, 1913, Herbert Osborn collector, all taken from poplar and one so labelled, four in the collection of Herbert Osborn, two in the U. S. National Museum, and two in the author's collection. Four paratypes, Cranberry Lake, New York, July 20, 1920, Herbert Osborn collector, all labelled "Populus", in the collection of Herbert Osborn. Paratype, Fish Creek, Wisconsin, August 14-24, 1926, Paul B. Lawson collector, in the collections of the University of Kansas.

Host: Poplar, *Populus* sp., probably *tremuloides* Michx.

Macropsis trimaculata (Fitch).

Pediopsis trimaculatus Fitch, Homop. N. Y. State Cab., p. 60, 1851.

Pediopsis trimaculatus O. & B., Proc. Dav. Acad. Nat. Sci., vii, p. 116, 1898.

Fuscotestaceous, the males nearly black, three pellucid white spots in a row on each elytron, clavus cinereous. Length: female, 5 mm., male, 4.5 mm.; width: female, 1.75 mm., male, 1.5 mm.

Pronotum parabolically obtuse-angled before, anterior impressions shorter than the long diameter of the eye; rugae strongly oblique, distinct though fine, median line wanting; posterior margin deeply incised. Face scarcely tumid when viewed from the side, plainly and evenly punctate, rugae distinct above. Clypeus narrow, longer than the basal width, the sides straight and parallel to the truncate and depressed apex. Lorae broad, strongly tumid. Scutellum finely punctate on the disc. Elytra short, roundly truncate, coriaceous in texture, veins weak. Genitalia: Oedagus of the male flaringly bifurcate at the apex. Last ventral segment of the female triangular, notched at the apex.

Color: Fuscotestaceous, the males nearly black. Face somewhat lighter, fuscopunctate, superior tip and apex darker, that of the male surrounded with a whitish halo. Lorae paler, yellowish. Beneath infuscated, the male nearly black, the margins of the segments lighter. Epimera each bearing a black bar which is nearly obscured in the male by the impigmentation. Episternal pieces heavily stained with fuscous. Pronotum of the female testaceous, a dusky patch on the disc; that of the male fuscous, overcast with cinereous. Scutellum cinereous, fuscopunctate, a dark triangle within either basal angle. Elytra with a pellucid white spot within the third and fourth apical cells, a larger one at the juncture of the antepical and basal cells, and a third near the branching of the first sector; veins pale, clavus cinereous. Wings smoky hyaline, veins fuscous.

The above description is based on numerous specimens from Colorado, Iowa, Illinois, Minnesota, Wisconsin, Michigan, Ohio, Pennsylvania, New York, Ontario, and Maine. This species has been confused with Van Duzee's *insignis*, the description of which follows, together with a discussion of the synonymy that has arisen. This is the insect Osborn and Ball had before them. However, they failed to recognize a few specimens of *insignis* which were also before them, though much in the minority.

Host: Wild plum, *Prunus* sp., probably *americana* Marsh. It frequently occurs along with *insignis* although either may, and does often, occur alone in a given situation.

Location of type: If not lost, the type should be in the Fitch Collection at the New York State Museum, Albany.

Nymphs: The nymphs are robust in form, with short transverse head, convex pronotum, and broad abdomen in keeping with other species of the genus. However, they belong to that group in which the abdomen is lifted into a sharp crest, each segment of which ends in a well defined tooth which projects backward. In such characters they differ markedly

from the nymphs of *tristis* Van D. Their coloration is a reddish-brown, contrastingly marked with fulvous and quite freely fuscopunctate. Pronotum medially fulvous. Basal angles of the scutellum blackish, a broad fulvous vitta contiguous to the scutellar region, and a second just caudad and paralleling it. Wing pads mostly yellowish-green. Seventh, eighth, and ninth abdominal tergites fulvous near the crest, the teeth black; and usually a fulvous vitta arises on either side of the abdomen near the origin of the second pair of wing pads and widens posteriorly, ending on the lateral margins of the seventh and eighth tergites. Face dark brown, clypeus and beneath yellowish, thoracic pleurites blackish, legs yellowish, striped with blackish, genital pieces infuscated. Nymphs on which this description is based were taken from wild plum in Ashtabula County, Ohio, in June, 1931.

***Macropsis insignis* (Van D.).**

Pediopsis insignis Van D., Ent. Am., v, p. 171, 1889.

Fuscoferruginous, resembling *trimaculata* Fitch with which it has been confused, but lighter in color and having only one pellucid white spot on each elytron and that usually obsolete in the male. Length: female, 5 mm., male, 4.25 mm.; width: female, 1.75 mm., male, 1.5 mm.

Pronotum parabolically obtuse-angled before, anterior impressions shorter than the long diameter of the eye; rugae fine, strongly oblique, median line often wanting; posterior margin deeply and roundly arcuated. Face moderately tumid when viewed from the side, rugae and punctures distinct. Clypeus much longer than broad, sides straight and parallel to the broadly rounded apex which is scarcely depressed. Lorae broad, somewhat tumid, not so tumid as those of *trimaculata*, thick, almost coriaceous in texture, veins weak. Genitalia: Oedagus of male stylate. Last ventral segment of the female broad, triangular, notched at the apex.

Color: Fuscoferruginous, covered with a distinct pruinosity when freshly collected, the males somewhat darker. Face and beneath brownish-fulvous, superior tip and apex somewhat darker. Lorae pale, yellowish. Epimeron with a small brown dot, and a brown spot occupying the lower half of the episternum. Abdomen of the male blackish above, the margins of the segments paler. Pronotum ochraceous, a dusky patch on the disc with a curved extension on each side along the posterior margin toward the humeral angles. Scutellum ochraceous with a fuscous triangle within either basal angle. Elytra uniformly fuscoferruginous, or slightly paler apically along the costa,

opaque except for a pellucid spot on the bases of the two inner antepical cells, veins pale. The elytra of the males are concolorous except for the somewhat paler veins. Wings fuscohyaline, the veins darker.

Specimens from Pennsylvania, New York, Ontario, Ohio, Wisconsin, Minnesota, Iowa, Kansas, South Dakota, and Colorado were examined in the preparation of the above description. The New York material included one cotype specimen.

Host: Wild plum, *Prunus* sp., probably *americana* Marsh. This species often occurs along with *trimaculata* Fitch. The writer took both species from a plum thicket near Brookville, Pennsylvania, in the summer of 1931 and again in Ashtabula County, Ohio. However, a large number of specimens were swept from a plum thicket near Racine, Wisconsin, and not a *trimaculata* among them.

Location of types: Collection of Herbert Osborn and Iowa State College, Ames.

Nymphs: The nymphs are of the same form as those of *trimaculata*, but are uniformly ferruginous in color, lacking the fulvous or yellowish markings of that species. Freshly collected specimens are covered with a pruinosity which, together with their color, renders their presence on the younger branches of the host plant quite indistinguishable.

When studying the specimens that had been swept from a plum thicket near Brookville, Pennsylvania, it was found that they fell into two rather distinct groups. Furthermore, it was found that Fitch had enumerated those characters in preparing his description of *trimaculata* which were the most obvious and at the same time the most characteristic of one of these groups. The second group was checked against Van Duzee's description of *insignis* and led to the conclusion that Van Duzee must have had this insect before him. It is probable that Van Duzee may have had specimens of *trimaculata* before him also. In fact, one suspects that he did from the wording of his description in places. However, no mention is made of more than one spot on each elytron; and when the insects of this second group were compared with a cotype specimen of *insignis*, they proved to be of the same species. As a final check the male genitalia were examined and left no doubt as to the two groups belonging to different species. The oedagus of the male of *trimaculata* is flaringly bifurcate while that of *insignis* is stylate.

Macropsis quadrimaculata sp. n.

Fulvous to reddish-brown, the pronotum acute-angled before, each elytron bearing two white spots, one on the corium and one in the base of the clavus. Length: female, 4.5 mm., male, 4 mm.; width: 1.5 mm.

Pronotum a little less than right-angled before, strongly convex, anterior impressions shorter than the long diameter of the eye; rugae coarse and distinct over the entire surface, strongly oblique, median line indicated; posterior margin bearing a rather deep angulate incision. Face but slightly tumid when viewed from the side, rugae and punctures coarse and shallow. Clypeus very small and narrow, the sides straight and converging somewhat toward the strongly depressed truncate apex. Lorae of both sexes very broad, each as broad horizontally as the width of the clypeus, strongly tumid. Scutellum finely punctate on the disc. Elytra coriaceous, short and broadly rounded at the apex, veins weak. Genitalia: Oedagus of the male stout, somewhat fundibulate at the apex. Last ventral segment of the female keystone-shaped, a shallow semicircular notch in the posterior margin.

Color: Fulvous to reddish-brown. Pronotum fulvous, immaculate. Face and beneath fulvous, immaculate except for the fuscous stains on the epimera and episternal pieces which are not always present. Scutellum fulvous, a fuscous triangle within either basal angle. Elytra reddish-brown, opaque, a pellucid white spot anteriorly on the clavus near the point of articulation, and a second posteriorly on the corium, occupying in part the bases of the antepical cells. Wings whitish hyaline, the veins fuscous.

Six specimens are before the writer: Holotype, female, Hot Springs, South Dakota, August 27, 1922, H. C. Severin collector, and allotype, male, same data, in the collection of D. M. De Long; paratype, female, Capa, South Dakota, September 24, 1920, H. C. Severin collector, in the author's collection; paratypes: male, Sioux County, Nebraska, August, 1903, and female, Swannanoa, North Carolina, August 23, 1919, Herbert Osborn collector, in the collection of Herbert Osborn; and paratype, female, Carl F. Baker Collection, "Colo. 1593," U. S. National Museum, in the National Museum.

Host: Raspberry, *Rubus* sp.? The holotype and allotype specimens bear the host label "Raspberry." If further studies reveal that *Rubus* is indeed the host of this distinctive species, it will be the first nearctic species known to live on plants other than those classed as trees.

SYNOPTIC TREATMENT OF THE SPECIES.

The following is an attempt to arrange the nearctic species according to their apparent affinities. For the majority of cases, these tend to arrange themselves into rather well defined groups as regards structure and form. As a rule, the groups seem to differ more from one another than the species do within any one group.

Nubila group: At the present time *nubila* Van D. is the sole representative of this group. The reticulate venation of the elytra and the lack of any very definite arrangement in the rugose puncturing of the pronotum are indicative of its uniqueness.

Punctifrons group: *Gerhardi* sp. n. and *punctifrons* Van D. have been placed here. Both are small with characteristic form and appearance. The veins of the elytra of *punctifrons* are contrastingly dark while those of *gerhardi* are outlined by heavy stippling. In place of the spots found on the face of *punctifrons*, the face of *gerhardi* is thickly set with prominent black impressed points.

Virescens group: These two palaeartic species, *virescens* Gmel. and *ulmi* Scott, have been placed here. Both species have the pronotum acute-angled before, the rugae strongly oblique, and the hind tibiae each bear a prominent black spot on the outside near the base.

Reversalis group: *Reversalis* O. & B. and *trivialis* Ball represent this group. Both males and females are green, the males only being marked with black. Each male has the extremities of the fore, and sometimes the middle tibiae, the tarsi, and usually the epimera, marked with black.

Viridis group: The *viridis* group contains three species: *viridis* Fitch, *hesperia* sp. n., and *occidentalis* Van D. The females are greenish and unmarked except for the black spots on the epimera of *occidentalis*. In contrast, the elytra of the males are some shade of amber, and the abdomen is distinctly fulvous in contrast with the greenish head and thorax.

Suturalis group: *Suturalis* O. & B., *bicolor* Osb., *sordida* Van D., *canadensis* Van D., and *rufocephala* Osb. have been placed here in the order given. The color pattern of the male is essentially that of the female. The blackish sutural stripe of *suturalis* can be thought of as spreading over and occupying the entire upper part of *bicolor*, breaking up in *sordida* and beginning to differentiate into transverse bands which reach their final development in *canadensis*. The dark coloring has disappeared from the elytra of *rufocephala*, remaining only on the upper part of the head and thorax.

Ferruginoides group: *Ferruginoides* Van D. and *erythrocephala* G. & B. represent a distinct group. The pronotum is strongly angulate before, and the face is concave just below the vertex. Both males and females have essentially the same color pattern. The rusty brown coloring of *ferruginoides* appears to have almost vanished from *erythro-*

cephala, remaining to enliven the upper part of the head and thorax of some females, and persisting to a greater extent in some males.

Pallida group: Two species have been placed here: *cinerea* sp. n. and *pallida* sp. n. Both have a characteristic form and appearance, the elytra are nearly hyaline, and the epimera of the females are marked with prominent black spots.

Aurifera group: *Delongi* sp. n., *aurifera* sp. n., and *osborni* sp. n. have been placed here. The golden amber of the elytra of *aurifera* seems to have become concentrated in the basal halves of the claval areas of *osborni*, resulting in a blackish basal band. None of the females of this division have the epimera marked with black.

Nigricans group: *Nigricans* Van D., *bifasciata* Van D., and *tristis* Van D. constitute a rather well defined group. This is especially evident when the nymphs of this division are compared with those of others. The abdominal crest is scarcely developed in the nymphs of these species.

Robusta group: Two species, *robusta* sp. n. and *basalis* Van D., have been placed here. Both have a characteristic form and appearance. The head and thorax are fuscopunctate, and the pigment of the elytra of *robusta* might be said to have become concentrated in the bases of the claval areas of *basalis*.

Fumipennis group: This group takes in *fumipennis* G. & B. and *confusa* sp. n. Both the males and females of these species are similarly colored and have the epimera unmarked. The intense smoky-brown of the elytra of *fumipennis*, much reduced in var. *gleditschiae* O. & B., appears to remain as only a slight smokiness apically on the elytra of *confusa*.

Trimaculata group: *Trimaculata* Fitch, *insignis* Van D., and *quadrinaculata* sp. n. constitute a well defined group. The rugae on the pronotum of each are strongly oblique, the elytra are short and nearly coriaceous in texture, and each elytron is marked with from one to three round pellucid white spots. This is the only group in which the male genitalia present useful specific characters.

CONFUSING SPECIES.

Osborn and Ball (9) have pointed out some of the difficulties encountered in attempting to place the species belonging to this group. After several years of rather intensive work with the genus, the writer finds himself in perfect accord with their statement that it is one of the most difficult genera of the family in which to define species. However, with more material at hand than they possessed, representing many additional localities, and with their excellent work as a basis from which to proceed, the writer has reached the conclusion that many of the variations which were thought to exist were really due to a confusion of species.

Van Duzee had similar experiences in his earlier work. In the series of specimens which he had before him when describing his *sordida*, there are no less than three species. These very nicely account for the exceptions he mentions. It is to his credit, however, that he did not place type labels on any of the exceptions. Osborn and Ball had a fine series of *nigricans* Van D. for study, unnamed at that time, which they called *bifasciata* Van D. even though they had the type of *bifasciata* before them for comparison. One suspects that Van Duzee's confusion as to the identity of *trimaculata* Fitch was a contributing factor. Also, the insect which Osborn and Ball treated as *basalis* Van D. was an unnamed species, *osborni* sp. n. As in the case of *bifasciata*, they had the type of *basalis* before them for comparison. *Viridis* Fitch has frequently been confused with *trivialis* Ball and *confusa* sp. n.; and in much the same way, *sordida* has been confused with dirty and discolored specimens of *viridis*, and with *robusta* sp. n. Van Duzee's *insignis* has been confused with Fitch's *trimaculata*, and less frequently, *rufocephala* Osb. with *erythrocephala* of Gillette and Baker.

As our knowledge of the leafhoppers belonging to this group accumulates, it becomes increasingly evident that the species are less variable than formerly supposed. Both the nymphs and adults are quite definite in their color pattern; and each species seems to be restricted as to food plant.

LIFE HISTORY.

All nearctic species of *Macropsis* whose life histories are known show a great similarity in their seasonal development. Because of this similarity, the seasonal development of the various species will be summarized here. There is but one generation each year, winter being passed in the egg stage, the nymphs appearing in May in this region, and reaching maturity by the middle of June. Males issue as adults first, preceding the females by several days to a week. The adult life of the male is limited to about two weeks, that of the female being much longer. Females are present well into July and are often taken well into August. Oviposition doubtless extends over a period of several weeks. The eggs are inserted singly just beneath the bark tissue of two year old wood, usually in the vicinity of buds near the terminus of growth. The bark over

the egg is raised and the tissue around the egg is usually somewhat discolored. The very young nymphs feed on the unfolding leaves and leaf petioles. As they become older they take up positions on the stems in the axils of the leaves, where their resemblance to buds must afford them protection.

As exceptions to the above generalization, we find the plum inhabiting species, *trimaculata* Fitch, *insignis* Van D., and *tristis* Van D. not reaching maturity until early in July.

Each species known to us is tree inhabiting, with the possible exception of *quadrimaculata* sp. n., which has been reported from raspberry, *Rubus* sp. Of the thirty-two species treated in this paper, thirteen are quite definitely known to breed on *Salix*, five on *Populus*, three on *Prunus*, one on *Gleditschia*, and one on *Rubus*. It will be noted that the majority of palaeartic species are likewise known to breed on *Salix*. Does this mean that *Salix* is the original host of the genus? As additional evidence pointing to *Salix* as the original host, we find the next greatest number breeding on the closely related *Populus*. To attempt to account for the few species which are known to breed on quite distantly related trees is another matter.

ECOLOGICAL NOTES.

The present status of our knowledge concerning these leafhoppers indicates that the natural range of the host tree determines the distribution of the insect. In a broad sense, the ecological conditions which favor the development of the host tree also tend to insure the presence of the insect that is dependent upon it for food and shelter. More specifically however, certain species have achieved niceties of adaptation to their immediate surroundings which are worthy of note.

Perhaps the most obvious of these adaptations are colorations which afford both nymphs and adults concealment while at rest on the host. Both the nymphs and adults of *insignis* Van D. are covered with a pruinosity that, together with the natural color of the insect, enables them to blend nicely into the background afforded by the branches of the plum tree on which they rest. The nymphs of *tristis* Van D., which are found on the same host, are covered with fine white hairs which produce a similar effect to the pruinosity of *insignis*. Similarly, the smoky or fuscous overcasting of the green bodied *fumipennis* G. & B. aids in its concealment. Both the nymphs and adults

are so colored, and are found on the leaf stalks and younger branches of the Honey Locust which are bright green with more or less of the same smoky overcasting. The coloration of both the nymphs and adults of *nigricans* Van D. affords them protection. As stated elsewhere, the nymphs are found in or near the axils of the leaves of the cottonwood where their shape and coloration favor their concealment. When resting beside a bud in the axil of a leaf, only sharp and well trained eyes can detect their presence. The examples cited are those best known to the writer. The adaptations of *viridis* Fitch and *ferruginoides* Van D. and others are no less interesting.

Of equal advantage, though not so evident, is the extent to which these insects seem to "rely" on the effectiveness of their protective coloring. While studying the nymphs of *nigricans*, it was noted that ordinary provocation failed to cause them to shift their positions. After sufficient provocation they would move, but instead of leaping for safety, usually dodged around to the opposite side of the branch from their tormentor. This behavior is quite typical of the nymphs of these leafhoppers, and so tenaciously do they cling to their position that sweeping is a poor way to collect them.

HOST RESTRICTION.

The writer's studies, which are in keeping with those of others, indicate that each species will prove to be quite definitely restricted to a particular host tree during its developmental period. The development of the insect is also very nicely adjusted to certain stages in the seasonal development of the host tree. It has been suggested to the writer that this host selection may be determined by the presence of some glucoside such as *salacin*. As evidence purporting to sustain this suggestion, it is known that *salacin*, while common to a great many willows and to most poplars, has not been shown to be present in all; and one experienced in collecting these leafhoppers knows that in a mixed willow thicket he will find a certain species of *Macropsis* occurring in numbers on one variety, while its neighbors may be practically free of the insects. Likewise, the developmental period of the insect's life cycle may be adjusted, in part, to suit the availability of such a substance. It is known, for example, that *salacin* is abundant in the growing parts of the tree in the early spring, the supply gradually dropping off as the season advances, until by fall

there is relatively much more of the substance in the cortex of the stem. An investigation of such possibilities would doubtless lead to most interesting results.

FAUNISTIC RELATIONSHIPS.

The nearctic species of *Macropsis* as a group differ greatly from their palaeartic relatives in several rather striking characters. All palaeartic species which the writer has examined have a prominent black spot on the outside near the base of each hind tibia. Edwards (4) records eleven species for the British Isles, ten of which are described as having such a mark. Of the thirty species known to belong to the nearctic fauna, not one has even the suggestion of such a mark. The two palaeartic species, *virescens* Gmel., and its varieties, and *ulmi* Scott, which have become established here, both have this mark.

All nearctic species, with the exception of *punctifrons* Van D., have the veins of the elytra concolorous with the remainder of the elytra. In contrast to this, dark veins which are not concolorous with the rest of the elytra are the rule among palaeartic species. Among the nearctic species, three are known to have definite spots on the face: *tristis* Van D., *punctifrons* Van D., and *reversalis* O. & B. Of these, only *punctifrons* has the spotting characteristic of so many palaeartic species, namely, an irregular spot at the apex of the vertex, a round spot above each ocellus, and a pair of parenthesis-like spots on the upper part of the front, five in all.

Following his original description of *occidentalis*, Van Duzee discusses at length his reasons for considering his new species a connecting link between the two faunae. In the light of our accumulating knowledge of these leafhoppers, the writer considers that *punctifrons* is closer to the palaeartic fauna than any other. It has the typical spotting of the face and the dark contrasting veins of the elytra. So far it is known only from Arizona, a locality which places it in a faunal subdivision that is generally conceded to be more nearly related to the palaeartic than any other.

GEOGRAPHICAL DISTRIBUTION.

About eighty species of *Macropsis* have been described from all over the world. The genus is best known from the North

Temperate Zone. This is perhaps due to the greater amount of work which has been done on the faunae of these regions. China (2) includes ten species in his monograph of the Ethiopian species, most of which are known from South Africa. Kirkaldy (7) also records four from Australia and Dozier (3) one from Santo Domingo. It is evident that the African and Australian species are more closely related to the palaeartic fauna than to the nearctic.

The nearctic species are most numerous in the Transition and Upper Austral Zones of the Austral Region.* As pointed out elsewhere, the range of each species seems to be largely determined by the natural distribution of its host tree.

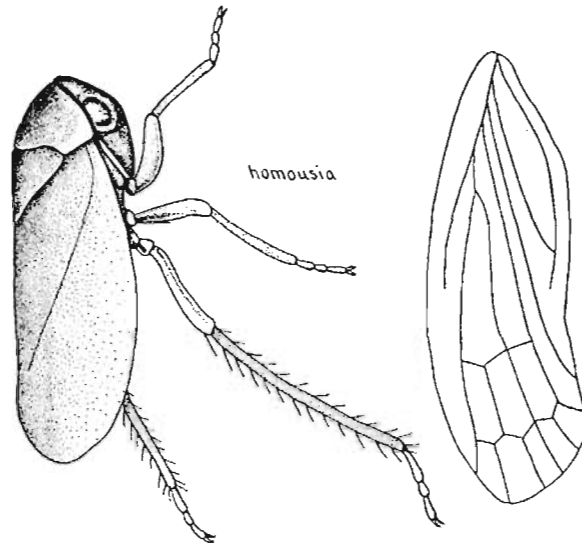


FIG. 3. *Macropsis homousia* (Germ. & Ber.), redrawn after Germar and Berendt.

GEOLOGICAL HISTORY.

Germar and Berendt (5) have described and figured a *Macropsis* from Baltic amber, whose fossil seems to be in an exceptionally fine state of preservation. An examination of the figure of this insect, *Macropsis* (*Bythoscopus*) *homousia*, leads to the conclusion that these leafhoppers of the Oligocene epoch of the Tertiary differed little from their posterity. (Fig. 3).

*Merriam, C. Hart, Life Zones and Crop Zones of the United States, U. S. Dept. Agr., Bull. 10, Div. Biol. Surv., 1898.

Such a high degree of development at that time indicates that they had been present on the earth a much greater length of time. The close association between these insects and the willows, *Salix* spp., and their near relatives the poplars, *Populus* spp., has been discussed. These trees have been traced back into the Cretaceous in an unbroken line. They were world wide in distribution then, and have been very much so since. It is possible that these insects became associated with their host trees somewhere near the time when they were becoming differentiated as a component part of the earth's flora. Amber is generally credited with being the petrified gum of a conifer, especially that of the spruce, *Picea susinifera*. It is common knowledge that willows, poplars, and spruce are often found flourishing in the same locality. Such a situation would favor the trapping of the various leafhoppers which feed on the willows or poplars in the gum exuded by the spruce and their subsequent preservation.

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EXPLANATION OF PLATES.

The figures illustrative of each species are grouped about the species name. The group in the upper right hand corner of Plate I is the key to each group on that plate. For example, the figures for *Macropsis gerhardi* on this plate have added to them the signs for the sex of each of the four figures. This is the key to the arrangement for all other figures on the plate.

